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Original Articles

THE OCULAR SYMPTOMS OF AFFECTIONS OF THE ACCESSORY SINUSES OF THE NOSE.*

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A few years ago there were but few specialists in the practice of diseases of the eye who did not combine with the treatment of affections of that organ that of diseases of the throat, nose and ear, also. By reason of the development of each of these several branches of medicine and the increased demands which have been made in consequence on the time and resources of those practicing them, the continuance of this combination of specialties has seemed no longer desirable and physicians are confining themselves more and more to but one subject. While this course is surely to be commended, and while the various departments of medicine will undoubtedly attain their highest development in this way, it should be remembered that the manner in which specialists have divided the body is purely arbitrary and that Nature draws no such lines of limitation, but that each organ has numerous connections and correlations with other organs, which every specialist and practitioner as well must thoroughly comprehend.

At the time when the custom of combining the practice of diseases of the eye with that of the nose and throat was in vogue, but little was known of the accessory sinuses of the nose and their affections, and with the exception of diseases of the lachrymal apparatus, which were clearly recognized to be most often of nasal origin, it was considered that there was but little connection between diseases of the eye and those of the nose; when the separation of the specialties was made, therefore, the divorce seemed natural, and further consideration of the nose and its diseases by the ophthalmologist was deemed unnecessary, while the rhinologist, for his part, regarded the eye as an organ with lenses and strange acting muscles in which he had no interest. Within the past few years, however, an entirely new field has been opened up by a more thorough comprehension of the anatomy and pathology of the air spaces connected with the nose, and by a better appreciation of the intimate relationship which these cells have with the orbit and its contents, so that now both ophthalmologists and rhinologists realize the need of a better understanding of this border-land between their specialties. As a consequence, numerous valuable pathologic and clinical studies have been made, which have done much to elucidate the subject and to re-associate ophthalmology and rhinology, not in the practice of a single individual, it is true, but in the more natural and better combination of two, of an ophthalmologist in conjunction with a rhinologist.

Thanks to these researches, the profession is now generally conversant with the general symptomatology of diseases of the accessory sinuses, and is familiar with the most striking, at least, of the ocular symptoms. That orbital abscess is usually secondary to disease of the sinuses, that displacement of the globe may be occasioned by encroachment on the orbit by a distended sinus, that blindness may result from an involvement of the chiasm through the roof of the cavity or by an implication of the optic nerve as it passes through its foramen in the sphenoid, as a consequence of an inflammation in the cells within that bone, are facts which are generally accepted. Beyond this point, however, the knowledge of most clinicians does not extend, and it is the purpose of this paper to call attention more generally to other less striking, though perhaps more frequent symptoms, to explain their significance, and by perfecting their symptomatology, to facilitate the diagnosis in a class which in their early stages yield readily to treatment, and are easily curable, whereas, if their nature is overlooked and the pathologic process causing them is permitted to continue, conditions may arise which may not only occasion serious inconveniences and distress in the nose, and greatly interfere with the organ of sight, but my involving the brain, may actually result in the death of the patient.

Before proceeding further, it seems desirable to make several statements in regard to diseases of the accessory sinuses of the nose, of which, it is believed, most practitioners are not cognizant. The first of these is, that very pronounced disease of any, or, indeed, of all the sinuses, may occur without occasioning any subjective nasal symptoms, and, secondly, that repeated rhinologic examinations may fail to discover pus in the nares in sinusitis, the affection of the cavity being only detected by catheterization and irrigation.

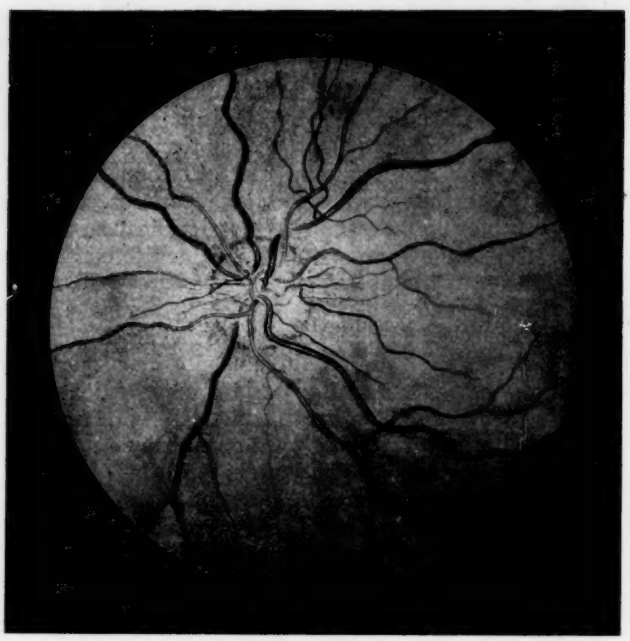
The earliest symptoms of many diseases of the accessory sinuses are ocular, and on this account the oculist is often the first to be consulted. I have no hesitation in saying that in such event, most of these symptoms are attributed to eye strain, and refraction advised. By good fortune, however, this error in diagnosis does not always work injury to the patient, for the refraction test often not only entirely relieves the symptoms, but actually cures the sublying condition, not, however, as was intended by the relief afforded the eyestrain by correcting lenses, but by the atropin which was employed to put the ciliary muscle at rest drying up the secretion in the sinuses. In many cases such desirable results do not follow, and the patient is subjected to a repeated series of examinations which fail to accomplish their purpose and permit the development of chronic conditions in the nose and sinuses, which become intractable to treatment and prolong the

* Read in the Section on Ophthalmology of the American Medical Association, at the Fifty-sixth Annual Session, July, 1905.

duration of the case indefinitely. It behooves us, therefore, as ophthalmologists, to be familiar with the symptomatology of sinus affections and to be able to detect the earliest ocular symptoms which they induce, for by so doing we may not only be of service to the rhinologist in diagnosing cases which are often obscure by reason of subjective and objective nasal signs, but also save our patients from the injury of misapplied treatment.

SYMPTOMATOLOGY.

1. *Disturbances in Vision and the Visual Field.*—By reason of the intimate association of the optic nerve with the sphenoid bone, and as Onodi has shown, in many cases with the posterior cells of the ethmoid, this nerve is more or less implicated in the majority of active inflammatory conditions of these cavities. Indeed, were it not for the double layer of periosteum which covers the bone forming the barrier between the nerve and the sinus, and for the protection afforded by its sheath, it would be difficult to comprehend how this nerve could escape implication in any affection of the sinus, for the



separating layer of bone is frequently as thin as paper and contains many dehiscences.

The involvement of the optic nerve, as a consequence of ethmoidal or sphenoidal sinusitis, may vary in degree from a simple edema to an active retrobulbar inflammation. While this latter inflammation is rare, even in cases of marked sinusitis, edematous infiltration is common, although as the change wrought in the nerve is but slight, and the symptoms which it excites are not striking, they must be searched for with some care. As a rule, the patient complains of some dimness of vision in one eye, at times of vertigo, headache and other head symptoms. When the ophthalmoscope is employed, the unaffected eye is usually found to be normal, while in the fellow eye a slight veiling of the edges of the nerve is seen, with a dilatation of the retinal veins and a choking of the lymphatics around the central vessels; in fine, the changes depicted in the sketch, which was made for me from the eye of a patient with acute sphenoiditis.[1] If the sinusitis is unchecked and retention of the contents of the cavity occurs, the nerve becomes more involved and the familiar signs of a retro-bulbar inflammation of the nerve appear.

In cases of even slight involvement of the optic nerve, the patient is usually conscious of a dimness in the affected eye, although if the vision be tested in the ordinary manner it will be found to be equally good in each eye; in other words, that the vision for form is normal. If the light on the chart be reduced, however, or if Bjerrum's test card is employed, the difference in vision between the two eyes will be at once manifest, and it will be ascertained that the dimness in the affected eye was occasioned by a diminution in the light sense, as a consequence of the edematous infiltration of the highly organized bundle of fibers which supply the macular region.

The extent of the involvement of the nerve may be further studied by the perimeter, by means of which it will often be possible to differentiate relative central and paracentral scotoma, and at times a concentric contraction of the field. If the congestion of the nerve progresses to inflammation and the conducting power of its fibers is further interfered with, then more positive defects in the visual field will appear, and it will be possible to outline absolute scotoma, both central and paracentral, and peripheral contractions in the field, in accordance with the location and the degree of involvement of the nerve. Ziem found contraction of the visual field in a large proportion of cases, especially in empyema of the antrum, and explained it by the cyclitis which he found in such cases resulting from disturbances of the circulation between the nose and the eye. Kuhnt likewise discovered concentric contraction of the field, especially for red and green. As these observations have not yet been corroborated by others, it is probable that the changes in the fields in many of the cases reported by these authors was due to neurasthenia, which may have been induced by the sinus disease.

In this connection, it should not be forgotten that optic neuritis may arise in individuals with sinusitis from other intercurrent causes, such as the abuse of tobacco or alcohol. A chief characteristic of neuritis due solely to sinus inflammation, however, is its unilateral character, for although both nerves may be affected in the optic canal by inflammation of both sphenoidal sinuses, such cases are very rare.

Tumors of the sphenoidal and ethmoid, unless they break through the walls of the sinus and involve the tissue of the nerve directly, do not, as a rule, cause disturbances of vision. As proof of this assertion, may be mentioned the cases of Baratoux, Hajek, Foucher and others, in which large sequestra of the sphenoid were exfoliated and passed through the nose, without giving rise to any defect in vision. In the cases, however, in which vision is affected by such neoplasms, Bull's statement may be accepted as authoritative, that "if an orbital tumor rapidly causes blindness and the latter starts from the temporal side of the field and leaves the region of the macula lutea unaffected to the last, and if at the same time a growth appears in the nose, it is probable that the tumor began in the sphenoidal antrum."

In addition to the various forms of implication of the optic nerve which have just been mentioned, vision may also be impaired by the mechanical obstacle offered to the proper passage of rays of light into the eye, either by reason of swollen lids, or of mucus retained

1. Paper read before the Baltimore Ophthalmological Society, Journal of Eye, Ear and Throat Diseases, March-April, 1905.

in the conjunctival cul-de-sac as a consequence of lachrymal obstruction. Haze of the vitreous from uveitis may also disturb it, and, finally, imperfect focusing of the eyes, the result of interference with the function of one or more of the extraocular muscles may occasion diplopia. While there is evidence that in a very few cases of nasal and sinus disease vision may be affected, and may, for a time, be absolutely suspended, purely by reflex irritation, without anatomic cause, the clinician should be slow to attribute the blindness in such cases to a reflex, and should first carefully exclude hysteria and the possibility of the existence of retrobulbar involvement of the nerve without ophthalmoscopic signs.

2. *Changes in the Orbit.*—It is now generally recognized that inflammation of the orbit of endogenic metastatic origin is rare, and that most diseases of this cavity are ectogenic, being occasioned by an inflammation of one or more of the accessory sinuses of the nose. The character of the symptoms and the form of inflammation which the disease of the sinus excites in the orbit, depends first on the particular sinus or group of sinuses affected, and secondly on the nature of the inflammation in the sinus. Thus, for example, a chronic distention of the walls of a sinus (hydrops) may occasion dislocation of the globe, with the necessary attendant of more or less functional derangement of the ocular muscles, giving rise to asthenopia or actual diplopia; or the refraction of the eye may be altered by pressure, causing changes in the axis and amount of astigmatism, and, finally, disturbance in the proper canalization of tears may result from a displacement of the puncta lachrymalia, or by a lesion in Horner's muscle in the lid. In chronic cases, vision is but rarely affected, for even when there is exophthalmus, the sigmoid flexure in the optic nerve permits it to elongate and escape injury from the traction to which the displacement of the globe subjects it; in acute inflammatory processes of the orbit, on the other hand, vision is apt to be more or less involved, either from the very pronounced displacement of the globe which occurs in this class of cases, or from a direct implication of the nerve itself in the inflammatory process.

One of the earliest signs of involvement of the orbit is a change in the contour of the orbital ring. Usually this is occasioned by a distinct projection into the orbit cells, but at times the rim may be simply raised and roughened, either wholly or in part, by periostitis. In some cases of sinusitis an acute cellulitis of the orbit may develop without premonitory signs, and lead to the formation of an abscess which may point and discharge itself either externally through the skin of the lid, or in rarer cases into the antrum, nose or tear sac. In other cases, the sinusitis causes a circumscribed swelling to appear in various parts of the orbit, which may be either as hard and unyielding as bone, or may convey to the finger the impression of containing fluid.

Although it is frequently impossible by means of the ocular symptoms alone, to make a differential diagnosis of the particular sinus involved, in many cases the character of the displacement of the eyeball is of significance. Thus, disease of the frontal sinus, which is the most frequent form of sinusitis to occasion dislocation of the globe, by reason of the extreme thinness of the bone which separates its cavity from the orbit, causes the eyeball to be displaced down and out. Mucoceles formed from the ethmoid cells are circumscribed, and do not, as a rule, occasion any considerable diminution in the size of the orbital cavity; when displacement of the globe does occur, however, it is usually up and out. Dislocation from a mucocele of the sphenoid cells is uncommon, as in the rare cases in which mucoceles develop in these sinuses, the anterior wall, being the thinnest, is the first to give way and the orbital cavity escapes compression. The orbit enjoys a similar immunity in hydrops of the antrum, for the inner wall of these cells is the thinnest and is the first to yield, and the nasal cavity is encroached on. Proptosis always indicates pressure from behind the globe.

The location of the pointing of the abscess may also be of value, as indicating the particular sinus which is affected, abscesses of the frontal sinus tending to perforate at the middle of the upper lid, or at the superior internal angle of the orbit, those due to ethmoiditis at its lower, inner angle. A general orbital cellulitis may be occasioned by an acute perforation of any sinus. Disease of the frontal sinus may frequently be diagnosed by redness and swelling of the skin over the sinus, and by the pain which may be elicited by pressing on the roof of the orbit in the neighborhood of the pulley of the superior oblique muscle; indeed, it is often possible to outline the area of the sinus by noting the extent of the tenderness.

Disease of the sphenoid, as a rule, manifests itself by an early involvement of the optic nerve, either by perineuritis or by pressure on the fibers of the nerve, as it passes through the optic foramen, or along the outer wall of the sinus itself. In affections of this sinus, involvement of the ocular muscles is not uncommon, and cranial symptoms of more or less severity may arise, by reason of the connection which the sphenoid has with the floor of the middle cranial fossa. These latter symptoms may also be occasioned by perforation of the posterior wall of the frontal sinus, though this accident is of rare occurrence.

Ethmoidal disease chiefly manifests itself in the intraocular and conjunctival circulatory disturbances and in the production of asthenopia by interference with the extraocular muscles.

Inflammation of the antrum of Highmore is attended by orbital symptoms less often than that of the other cavities, but it may give rise to osteo-periostitis of the roof of the cavity and cause upward dislocation of the globe, and retrobulbar optic neuritis may result from infection through the lymphatics.

While this special symptomatology may hold good in many cases, it often fails, on account of the frequent variations in the anatomy of sinuses, for, as shown by Holmes, Cryer, Onodi, Turner and others, the relationship which the sinuses bear to one another and to the orbit is not by any means constant, and, while in most cases the cavities are separate, they may communicate. Thus, Onodi has demonstrated, by means of frozen sections, that the posterior ethmoidal cells frequently aid in the formation of the optic canal, and has noted that when this anatomic relationship is present, the layer which separates the sinus from the nerve is as thin as paper and is often perforated with dehiscences. It has been found, also, not rarely, that the frontal sinus forms the inner wall of the orbit, and that abscesses of its cavity may point in the neighborhood of the lachrymal sac.

As points of practical interest in connection with the diagnosis and treatment of orbital abscess, it should be remembered that the degree of the exophthalmus often varies in sinusitis, and that it may at times disappear entirely, being dependent on the patulency of

the orifices of the sinus, the amount of protrusion of the eye being naturally more marked when the size of the cavity is increased by retained secretion. This tendency for the degree of the exophthalmus to vary should be recognized, and should not lead to its being confused with the rare cases of intermittent exophthalmus which are dependent on a dilatation of the veins of the orbit. Finally, it may be remarked that even slight transient acute sinus affections may cause actual suppuration in either the periosteal or fatty tissues of the orbit; and that infection of the orbit may occur without an actual perforation of its walls, this being true not only of the very thin walls of the ethmoid cells, but also of the much thicker ones of the frontal sinus, the infection, in such cases, being carried not by way of the necrosed bone, but through the diploe, or along any one of the fine emissaries, either vascular, lymphatic or nervous.

3. Affections of the Lachrymal Apparatus.—Sinusitis may indirectly, by way of the nasal mucous membrane, be a frequent cause of disease of the lachrymal apparatus, but is the direct agent only in those rare cases where an empyema of one of the sinuses discharges itself into the sac, or, what happens more frequently, into the neighborhood of the sac, giving rise to phlegmonous inflammation of the tissues around the sac.

These prelachrymal abscesses may result from an empyema of the frontal sinus, as a consequence of an anomalous distribution of the cells, or, finally, from an abscess of the deeper parts of the orbit, the purulent matter gravitating into the region of the sac by the peculiarity of the insertion of the fascia. The differential diagnosis between these cases and true instances of lachrymal disease is often difficult, this being especially true of the class of cases described by Peters,[2] in which there are all the signs of abscess, and the sac itself appears dilated, but where the Bowman incision and the passage of probes into the nose does not release the pus, the purulent matter escaping only after the probe is withdrawn and passed horizontally into the cells forming the inner orbital wall. Peters points out that there is actually an ectasia of the sac in these cases, which is occasioned by a stoppage of the orifices of the sac by the pressure exerted externally by pus, which comes either from an empyema of the frontal or ethmoidal cells, from the maxillary antrum, or from a maxillary periostosis excited by a carious tooth.

4. Affections of the Lids.—Edema of the lids is one of the most significant symptoms of disease of the accessory sinuses, and may often be the means of calling attention to the existence of an inflammation in these cavities, the extreme thinness of the skin of the lids, and its loose attachment to the sublying parts, causing even a comparatively slight sinusitis to give rise to this condition. The puffiness is usually most marked in the upper lid and particularly on the nasal side, though the entire lid may be swollen. This edema is to be distinguished from the inflammatory swelling and thickness of the lid which results from cellulitis, as it is entirely non-inflammatory in origin, as well as in appearance, and also from the ptosis which is at times present as a result of a palsy of the levator of the lid. The swelling is usually most marked in the mornings and disappears during the day, but it is also apt to be brought on by bending the head forward. Like all other ocular symptoms of sinusitis, the edema may disappear for a time, with the discharge of secretion from the sinus, but reappears when the fluid reaccumulates and the congestion of the mucous membrane becomes greater.

A persistent blepharitis is not uncommon in association with the chronic inflammation of the conjunctiva which sinusitis sometimes excites, and yields to treatment only after the cause has been removed.

5. Affections of the Extraocular Muscles.—By reason of the juxtaposition of some of the eye muscles with the walls of the orbit, and the very close association of the nerves which supply them with the sphenoid cavity, as they pass along the outer wall of this sinus, paresis, and even paralysis of one or more of the eye muscles, may occur as a consequence of sinusitis. While complete paralysis demands an inflammatory process of considerable intensity, and is usually occasioned by a cellulitis of the apex of the orbit secondary to either an active sphenoiditis or ethmoiditis, or more rarely to antral disease, paretic conditions of the muscles may complicate comparatively mild cases of sinusitis, and may occur when the rhinological examination reveals only a congestion of the mucous membrane lining the cavity.

Chronic empyematous conditions of the sinuses rarely occasion marked muscular insufficiencies unless signs of active inflammation arise, for the distention of the walls of the sinus under such conditions is gradual and the displacement of the globe which follows is so slow that the muscles have an opportunity to adjust themselves to the changed conditions of the visual axes under which they are forced to operate. In acute cases, the paresis is occasioned either by direct inflammatory infiltration of the long, broad, flat belly of the muscles themselves, as they lie in association with the walls of the sinus, or by an involvement of the nerves supplying them as they enter the orbit. As in many of these cases the function of the muscle is but slightly interfered with, diplopia is but rarely complained of, and can be detected only by careful search in the periphery of the field by the aid of a colored glass. Under such circumstances, the diagnosis may often be facilitated by requesting the patient to indicate in which direction movement of the eyes is especially painful, as considerable distress is often excited when the eyes are rotated into the position in which fullest demand is made on the affected muscle.

As a consequence of this paretic condition of the muscles, vision is often blurred, and while, as just stated, many of the palsies are not sufficiently marked to induce diplopia, when the eyes make their ordinary excursions, the imbalance created is sufficient to confuse vision, to cause vertigo, to excite reflex gastric symptoms and to render the near use of the eyes difficult. By reason of their anatomic relationships, paralysis of the levator, of the superior rectus and superior oblique muscles, serves to indicate a probable involvement of the frontal cells; paralysis of the internal rectus, an involvement of the ethmoidal; and paralysis of the inferior rectus or inferior oblique muscles, an inflammation of the antral cells. As sphenoiditis may, however, implicate any or all of the nerves supplying these muscles, the value of differentiating the precise muscle affected, as a localizing symptom indicating the involvement of any particular sinus, is not great. Diplopia in the periphery of the field does not always indicate that a muscle has been paralyzed, for it may be induced by a slight displacement of the globe, either by exudation or by the distended wall of a sinus.

Ptosis from paralysis must not be mistaken for drop-

2. Zeitschrift für Augenheilkunde, 1892, II, 2.

ping of the lid from edema. This differentiation is not always easy, for, as in all other signs and symptoms of sinusitis, both the edema and the palsy may be transient and may disappear, only to reappear after several hours or days, or even much longer intervals. It is by reason of this transient character that palsies of extraocular muscles due to sinusitis have been confused with the palsies which occur in connection with the rare affection known as "migraine ophthalmoplegic," or recurrent oculomotor palsy. In this condition, paralysis of one or more of the eye muscles supplied by the third nerve—though muscles supplied by other nerves may be affected—occurs in connection with an attack of migraine. The attacks come on in periodical crises and recur at irregular intervals. I recently had under my care a case of transient palsy of a part of the right third nerve, which appeared in association with great pain in the eye and temple, and the occurrence of a spectrum, where the symptoms were undoubtedly induced by an acute inflammation of the ethmoidal and sphenoidal cells. Although a careful analysis of a majority of the recorded cases of migraine ophthalmoplegic indicates a probable sinus origin in the number, I do not believe that such cases are true instances of this rare form of disease, as I consider that, while the pathology of the affection is in doubt, the strongest evidence points to its being of central origin.

I am of the opinion that if many of the cases of palsy of extraocular muscles attributed to rheumatism were analyzed that an affection of a sinus would be found to be the underlying cause in many instances. Such palsies may appear after "catching cold," and are associated with more or less pain on moving the eye, and possess other characteristics which suggest the presence of an acute sinusitis.

6. *Affections of the Conjunctiva.*—In chronic disease of the sinuses, the mucous membrane of the nose is not infrequently affected, and the thickening and congestion which exist there are often transmitted to the mucous membrane which lines the lids and covers the eyeball, not only by direct continuity of structure, by way of the tear passages, but also as a consequence of the general venous and lymphatic congestion of all the parts about the eye, occasioned by the disease of the sinus. In acute cases the conjunctiva is not rarely inflamed, probably by direct infection from the mucous membrane lining the sinuses, and presents the appearance of a typical attack of catarrhal conjunctivitis. In many of the chronic cases, the follicles of the conjunctiva become enlarged, and it is the involvement of these bodies, together with the turgescence of the conjunctiva, which occasions the feeling of heaviness of the lids and aggravates the asthenopia which is so frequent a symptom of sinus disease.

7. *Affections of the Cornea.*—Disease of the accessory sinuses rarely gives rise to keratitis except indirectly, as a consequence of the exposure to which the cornea is at times subjected in extreme degrees of displacement of the globe by a distention of the walls from empyema or by cellulitis, or as a part of a panophthalmitis which may be excited by the cellulitis. Occasionally, however, herpetic-like blisters may form on the cornea, as in cases recently reported by Ellinger[3] and myself,[4] as a consequence of implication of the fifth nerve as it passes along the outer wall of the sphenoid sinus.

8. *Pupillary Changes.*—A slightly dilated pupil may at times direct the attention of the clinician to the existence of an inflammation in the posterior ethmoidal or sphenoidal sinuses, being occasioned by the optic neuritis and the consequent diminution in vision and the reduction in the light sense which accompanies the inflammation of the nerve. This dilatation increases disproportionately when the illumination is diminished and is unattended by any restriction in the play of the iris to direct or indirect light stimulus. In cases of active inflammation at the back of the orbit, the pupil may be widely dilated and fixed, from serious involvement of the third nerve.

9. *Affections of the Uveal Tract.*—When the enormous extent of mucous membrane which is spread over the nose and its sinuses is taken into consideration, and account made of its large venous and lymphatic channels and the very close and intimate association which these vessels have with the blood vessels and lymphatics of the eye, it seems extraordinary that the eye should not be the seat of active inflammatory processes in all cases of sinusitis, and that the uveal tract, especially, should not be frequently involved. And yet it would appear, despite the claims of Zeim and others, that involvement of the interior of the eyeball, either by emboli or direct infection, is very rare. The thought occurs that, in order to obviate this, there is some controlling mechanism, some peculiar arrangement, perhaps, of the vessels, of which we are as yet unaware, which protects the eye from participating in these inflammatory conditions, just as there is some subtle mechanism which controls and regulates the intraocular circulation and makes it more or less independent of that of the general system.

Zeim, Fromaget, Fish and others have recorded a number of cases of uveitis due to sinusitis, and attribute the inflammation to the general impediment in the circulation and to the irritation of the maxillary branch of the fifth nerve, occasioned by the empyema of the sinus. These authors claim to have seen marked improvement in cases of this nature follow treatment of the sinus. As yet, however, cases of uveitis from sinusitis have been recorded by but a few, and further observations are necessary before the correctness of these views can be established.

10. *Cataracts.*—Equally problematical is the claim of Zeim that cataracts may be occasioned by disease of the sinuses. This author asserts that he found chronic suppuration in the nose in many cases of opacity of the lens, and adds that in a number of cases of unripe cataract he improved vision by treating the sinuses. Kuhnt partially supports this statement, as he states that he frequently saw spoke-like opacities of the posterior cortical in antral disease, especially in young individuals, with no other changes visible in the fundus or general system. The same author has seen vitreous opacities clear up after treatment of the sinuses. He attributed both the change in the lens and vitreous to an interference with the nutrition of the ciliary body, which he considered to be of a circulatory nature. An observation of Eversbusch which is especially interesting may be cited in this connection, of a swelling of the middle turbinated body preceding a so-called sympathetic inflammation of the other eye. As a consequence of this experience, he makes it a rule to examine the nose in cases where there is any ground to suspect sympathetic trouble, enucleation of the affected eye being advised as soon as nasal symptoms arise.

3. Zeitsch. f. Aug. 1, p. 174.
4. Journal of Eye, Ear and Throat Diseases, March-April, 1905.

11. Refraction.—Diseases of the sinus may occasion change in the refraction directly by the pressure exerted on the globe by the wall of a dilated sinus, and it is not unlikely that in early childhood disease of the nose may indirectly alter the refractive condition. Thus, it is well known that the form of the orbit determines, in large measure, the shape of the human eyeball. As a further step, Zeim has proved by experiments on dogs and rabbits that blockage and purulent inflammation of a nares will occasion marked inflammation in the skull and side of the face, and Kuhnt has deduced that the same facial asymmetry may result in human subjects from a deviation of the septum which is consecutive to a chronic swelling of the nasal mucous membrane. Batten and Fish consider sinusitis to be an etiological factor in myopia, as a consequence of congestion and spasm of the ciliary muscle, thereby retarding its natural contraction and relaxation and reducing accommodation.

12. Asthenopia.—Asthenopia is not rare in sinusitis, and the failure of proper lenses to relieve such symptoms is explained by the fact that they originated, not in an error of refraction, but in an inflammation of a sinus. In many of the cases the asthenopia may be attributed to the conjunctivitis which sinusitis excites, but in others it is traceable to an interference with the ciliary muscle, and actual testing will show a diminution in the range of accommodation. Hoople, who has contributed an interesting article on this subject, thinks that a moderate amount of pressure or mechanical irritation of the middle turbinate and adjacent septum will temporarily impair the function not only of the ciliary muscle, but, to a more or less variable extent, that of the internal rectus muscle as well, thereby aggravating the asthenopic symptoms still more. De Schweinitz, also, has called attention to asthenopia as a consequence of intranasal disease, and thought these cases particularly interesting, because in each instance the refraction error and the faulty muscle balance were of such a character that the symptoms of which the patients complained would naturally be ascribed to these anomalies, and because the patients were, to a great extent, unaware of, or at least indifferent to, any serious or decided lesions in the naso-pharyngeal region. In an analysis of a large number of cases of asthenopia, Gradle found chronic catarrhal rhinitis, with secondary hypertrophy, or with stenosis due to deviations of or excrescences on the septum, in about 3 per cent.

13. Headache and Neuralgia.—Headache and neuralgia are rather constant symptoms of sinusitis, and, though they frequently possess no features which serve to differentiate them from similar pain due to other causes, at other times they present characteristics which are significant of sinusitis, and it is very essential that ophthalmologists should be conversant with these qualities, since the laity, who are ignorant as yet that headaches may have a nasal origin, and impute all forms of head pain to eyestrain, seek them first for relief.

The headaches of sinusitis occur usually in the morning and are characterized by continuous pain with severe exacerbations, which radiate around the orbit and within the zone of distribution of the fifth nerve; or they may take the form of a general head pain, of a facial neuralgia, or of a toothache, and may be constant or recur in severe paroxysms. Injection of the conjunctiva, lachrymation and photophobia are often present. The location of the pain is significant, for, while it may be reflected to a part of the head remote from the affected sinus, and may even be felt in the opposite side, yet its localization is generally characteristic and may enable the clinician to differentiate the particular sinus affected. Thus, neuralgia of the supraorbital nerve is very significant of frontal disease, and dental neuralgia will frequently indicate the existence of antral disease. Frontal headache is suggestive of ethmoidal and frontal disease, while occipital pain is usually caused by sphenoiditis, though disease of the frontal sinus may evidence itself in pain in that locality also. Pain in the vertex and at the back of the eyes is usually caused by sphenoiditis, though, on account of the close proximity of the fifth nerve to the lateral wall of the sinus and the nearness of the sphenopalatine ganglia, reflex pain to any part of the head may be occasioned by disease of that cavity. A distressing pain across the bridge of the nose is peculiar to ethmoid disease.

The headache of sinusitis may take the form of hemicrania, and may simulate migraine, or even the rare condition known as "migraine ophthalmoplegic." Pain is almost always present in acute affection of the sinuses and may attain great severity, while in chronic cases all suffering may be absent; in some cases, however, where secretion has been long retained and where there is a hyperostosis of the walls of the sinus as a consequence of repeated attacks of sinusitis, the suffering may be prolonged and severe. A symptom of very great value in the diagnosis of sinusitis is the sensation which is evoked by palpation of the affected areas. Thus, in frontal sinusitis exquisite pain is occasioned by palpating the forehead and the roof of the orbit at its upper, inner angle, and the same is true of the region over the antrum when that cavity is the seat of an acute inflammation.

In addition to head pain, there may be other symptoms of a general character, such as fever, evidences of cerebral irritation and congestion, neurasthenia and gastric disturbances. The increased temperature is due to absorption of pus and is generally irregular. Gastric symptoms are occasioned by swallowing some of the fetid discharge of the sinuses, and loss of appetite or a true gastritis may result. Such cerebral symptoms as malaise, inability to concentrate the mind, and actual depression, verging almost on melancholia, are observant more frequently in chronic cases. Delirium and mania betoken a state of actual involvement of the cerebral activity. When cerebral symptoms arise in sinusitis, they indicate either an involvement of the meninges without perforation of the wall of a sinus, or more usually an actual perforation, in which latter event abscess of the brain rapidly follows. Abscesses of the orbit not rarely give rise to cerebral complications, and meningitis, abscess of the brain and thrombosis of the cavernous sinus may follow.

DISCUSSION.

DR. C. R. HOLMES, Cincinnati, said that a large field is still unexplored in the relation between the accessory cavities and the eye. He has taken many fields of vision in these cases but has not found that many patients exhibited contraction. He has found that in many chronic cases there is a rise of temperature, sometimes of one or two degrees daily. He thinks this a chronic septic condition. Dr. Holmes said that in sphenoidal cases the pain is generally referred to the temple. He passed around a section from such a case, showing how easy it is for a disease in the sphenoidal cavity to invade the optic nerve and the eye. He said that this is the first case on record in which there was total blindness following trouble with the sphenoid on one side. The patient was

not able to see an electric light before the eye, but after opening the sphenoid his sight was completely restored.

DR. E. J. BROWN, Minneapolis, fifteen years ago reported the case of a boy about ten years of age who had suffered from diminution of vision and very contracted fields. The boy had very large adenoids and Dr. Brown ascribed the trouble largely to that. On removal of the adenoids the fields were immediately restored to normal. The patient remained under observation for many years and is still under his care. Dr. Brown found later that the boy had sphenoid disease and the optic atrophy which resulted from that condition has persisted. Dr. Brown had a patient who came to him complaining of slight tenderness at the inner canthus, over the root of the nose and having a slight amount of astigmatism to which his trouble was at first ascribed. Correction of that, however, gave no relief. He came back, and on entering a small probe into the frontal sinus Dr. Brown caused the exudation of a small amount of pus. Removal of the head of the middle turbinate on that side gave relief to all his symptoms. Another case of similar character was relieved in that way within a few weeks.

DR. W. H. SNYDER, Toledo, called attention to the fact that a number of prepared sections show perfectly the relation of the mucous membrane after the bone has been removed and there seems to be no normal shape and size of the sinuses. In a number he prepared last spring there was no opening into the sinus. Simple probing through the nasal cavity would not bring pus in such cases.

DR. F. W. HILSCHER, Spokane, declared that he has seen a great many patients in whom symptoms of this character have been going on for a great while with more or less destruction of vision and that have been through the hands of men otherwise competent. He has had cases in which he did not discover pus at all in the sinuses but in which there was pressure between the turbinates and septum that gave rise to the same symptoms. He thinks, therefore, that we need not always expect to find pus to account for these symptoms. Just contact of the surfaces will produce them. He mentioned the case of a middle aged lady with a hypermetropic error who declared that whenever she took the glasses off she had a great deal of tinnitus.

DR. S. D. RISLEY, Philadelphia, said that his attention once having been called to the important relation between certain obscure affections of the eye and the diseases of the sinuses contiguous to the orbit he was surprised to find how frequently they occur and rather reproached himself for not having observed the fact before. This condition need not cause surprise, however, when it is remembered that these sinuses all drain into the nasal cavities and the numerous circumstances in life which lead to the blocking up of the ducts and the close anatomic relationship which exists between the sinuses and the orbit are taken into consideration. Dr. Risley was struck with the statement with regard to the absence of choroidal disease in the cases observed by Dr. Posey. Dr. Risley published a group of cases some time ago in which defective vision was associated with disease of the sinuses and in all there was marked choroidal disease. He thinks, therefore, from personal observation, that choroidal disease should not be excluded as one of the associations with this form of trouble. He recently had a patient with exophthalmus, and optic neuritis of obscure origin, in whom it was only after probing the frontal sinus on that side that the diagnosis was cleared up. On opening this Dr. Risley found a large collection of pus which had escaped into the orbit and collected back of the eyeball. In another case of exophthalmus, transillumination showed the trouble to be in the maxillary antrum on that side. These conditions are varied and, therefore, in obscure cases of eye disease the study of the case should never be considered complete until we have observed, by transillumination and other means open to investigation, the condition of the accessory sinuses.

DR. LEARTUS CONNOR, Detroit, said that it has been a habit of his for many years when any case of eye trouble was not satisfactorily disposed of within a reasonable time to investigate the sinuses. He has sometimes been reproached by his colleagues for calling attention to these matters. The expert management of these conditions in their gravest form calls for manipulation that not all ophthalmologists desire to enter into.

DR. EDWARD JACKSON, Denver, declared that one point of Dr. Posey's paper needs to be reiterated, and that is the allusion to the difficulty of recognizing sinus disease. Dr. Jackson has so frequently referred patients when he felt that sinus disease was the cause of the eye trouble, to expert rhinologists and had them come back with the report that there was nothing the matter. He now feels more confidence in a certain clinical association of symptoms than in the ordinary rhinologic examination and in some cases certainly the examination must go as far as the removal of considerable tissue and very careful examination before a negative reply can be accepted. A few months ago Dr. Patterson, of Colorado Springs, published a paper on the connection of sinus disease with vitreous opacities. Dr. Jackson is inclined to think this a rather common cause of uveal trouble; sometimes producing vitreous opacities and sometimes not.

DR. J. A. DONOVAN, Butte, Mont., said that those who have watched adenoid children must have noticed the effect of that trouble on vision, especially on accommodative power. A diagnosis in these cases is a very important matter and he is convinced that often the symptoms are due to pressure and are much the same as those of ordinary rhinitis. The history is often the same as in rhinitis. It is almost impossible to make a diagnosis in these cases at one examination and it is not absolutely necessary, for the first treatment is not directed to the sinuses. Relieving the pressure of the anterior end of the middle turbinate often relieves the patients at least for some time.

DR. J. A. L. BRADFIELD, La Crosse, Wis., said that four months ago a woman, aged 32, was referred to him as a case of glaucoma. The fields for color were contracted. Vision was 20/100 and there was history of right hemicrania. Examination of the nose showed the middle turbinate to be large and cystic and on its removal recovery was rapid. Within a week vision was almost normal.

DR. H. STILLSON, Seattle, Wash., stated that last year he published a paper on the relation between diseases of the nose and diseases of the eye. In that paper he reviewed the literature on the subject and published statistics from his own practice. The subject is a very old one, there having existed considerable literature fifty years ago, but it is a subject that has been forgotten until recently and it is only just now that the extreme importance and the extreme frequency of the diseases of the eye and brain in their relation to diseases of the nose has been realized. Ideas of the symptomatology of the diseases of the accessory cavities of the nose are still extremely hazy.

DR. WILLIAM C. POSEY said, in reply to Dr. Bradfield, that the diminution in vision in the case he cited might have been due to edematous infiltration of the optic nerve. Sometimes if the vision be tested in cases of this kind it will be found to be normal, but on lowering the light the vision will be found to fall much lower than would be the case in the fellow eye, showing an interference in the conducting power of the fibers of the optic nerve. Dr. Posey agreed with Dr. Jackson that the great difficulty is in diagnosis in these cases. It is true that it is not necessary to find pus to account for these symptoms; simple congestion of the sinuses may produce them.

Malaria in British Central Africa.—Dr. H. Hearsey, principal medical officer British Central Africa, states, in the *Journal of Tropical Medicine*, that there are two forms of malarial fever in that country—the tertiary and the æstivo-autumnal. The tertian variety is by far the more common, and it frequently takes the type of a double infection. Multiple infection by tertian parasites is met with, causing the so-called irregular fever, and is the only variety of the fever which is generally resistant to quinin. Dr. Hearsey is inclined to regard hemoglobinuric fever as a "pernicious" form of the æstivo-autumnal, the absence of the parasites in the peripheral circulation being probably due to their having left the peripheral circulation for the spleen and bone marrow.

ACID INTOXICATION, AND LATE POISONOUS EFFECTS OF ANESTHETICS.

HEPATIC TOXEMIA. ACUTE FATTY DEGENERATION OF THE LIVER FOLLOWING CHLOROFORM AND ETHER ANESTHESIA.*

ARTHUR DEAN BEVAN, M.D.
AND
HENRY BAIRD FAVILL, M.D.
CHICAGO.

(*Concluded from page 696.*)

Stocker,[5] in 1895, reports an operation for strangulation of pedicle of ovarian cyst. A gangrenous pedicle was found and cyst and pedicle were removed. Stocker makes no mention of the anesthetic, but in Cohn's article referred to later he mentions chloroform as the anesthetic used. Probably this statement was made to Cohn personally. Shortly after the operation icterus was noted, the patient became restless, finally became comatose and died. An acute yellow atrophy of the liver was found at autopsy. Stocker believes that the atrophy resulted from the absorption of toxins from the strangulated and gangrenous pedicle. He does not lay much stress on the anesthetic used.

Victor Bandler,[14] in 1896, reports a case of late chloroform poisoning from Wölfler's clinic.

Patient.—Male, 42 years old; glass blower by occupation; apparently in good health, but a heavy beer drinker, often taking as many as 101 daily, was operated on at noon, July 18, 1895, for an incarcerated inguinal hernia. Omentum was found in hernial sac and was resected. The operation lasted about one hour. Anesthesia was easily produced and about 80 grams of chloroform were used. The morning following the operation icterus was noted. On the second day the icterus had increased and bile pigment was found in the urine. Patient was quiet, no pain in abdomen or wound; tongue moist; some headache and a striking apathy. Temperature 38.2 C., pulse 92. On the third day icterus was marked; urine brownish color; some blood in stool; urine rich in bile pigment; albumin, and in the sediment yellowish, granular and hyaline casts. There was some pain in the liver region, but the liver apparently was not enlarged. During the day icterus increased and little urine was passed. During the evening the patient suddenly became delirious, attempted to get out of bed and was restless.

On the following morning the patient was unconscious: there were hemorrhages into the abdominal wall, but the wound was clean. Leucin and tyrosin were found in the urine, and a diagnosis of acute yellow atrophy was made. The patient became comatose. There were petechiæ in the skin. Terminal rise of temperature to 40 C. Death occurred four days after operation.

Anatomic Diagnosis.—Acute yellow atrophy of the liver; icterus; multiple hemorrhages; fatty degeneration of the heart; chronic Bright's disease.

Erlach,[17] in 1896, in a personal communication to Bandler,[14] reports the death of a patient from acute yellow atrophy of the liver, following the use of Billroth's mixture; total extirpation of the uterus was done for fibroids. The predisposing cause was probably gastritis and catarrhal icterus. At the autopsy acute yellow and red atrophy of the liver was found.

Marthen,[18] in 1896, reports the following clinical history:

Patient.—Woman, 34, insane. The roots of fourteen carious teeth were removed under chloroform anesthesia. Anesthesia lasted about forty minutes, and about 70 c.c. of chloroform were used. Patient vomited frequently after anesthetic. The day following operation some icterus of the face and back was noted. Vomiting continued, and on the third day the patient became restless, uttered piercing cries and attempted to leave bed. There was convulsive tic of face and upper extremities. Pupils, maximum dilatation. Cheyne-Stokes respiration. Death.

Anatomic Diagnosis.—Fatty degeneration of heart muscle and kidneys. Acute fatty degeneration of liver.

W. Mintz,[19] in 1900, reports the following case:

Patient.—Male, 40 years old, heavy drinker, always well previous to present trouble. Operation, opening of appendiceal abscess and removal of gangrenous appendix. During evening of second day patient vomited three times; the vomitus contained blood. Vomiting persisted on the third day, accompanied by singultus. Slight jaundice, which increased in intensity. Death occurred seven days after operation, eighteen days after beginning of disease.

Anatomic Findings.—Erosions in duodenum and along lesser curvature, corresponding to which were numerous obliterated arterial lumina.

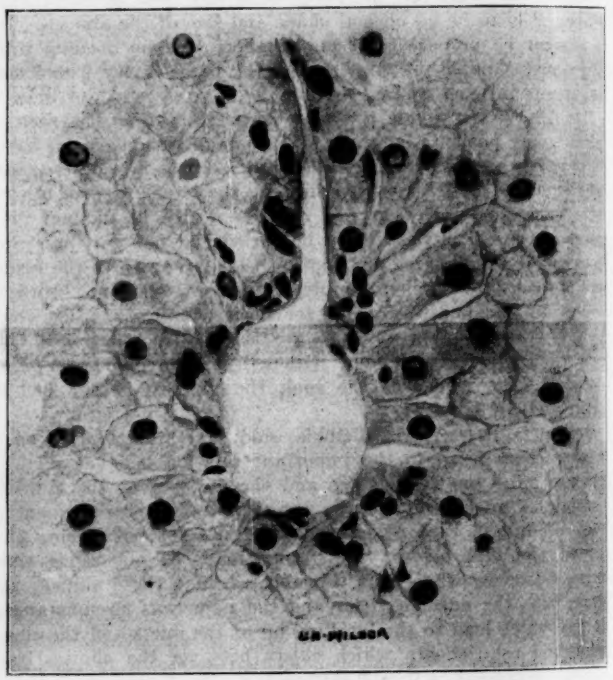


Fig. 1.—Section of liver of healthy rabbit, showing nuclear and cytoplasmic characteristics. Stained with hematoxylin and eosin.

Anesthetic is not mentioned. The author speaks of direct relation to epityphilitis.

Cohn,[4] in 1902, reports a case of protracted chloroform action resulting fatally.

Patient.—A woman, aged 21, with no apparent predisposing cause, was operated on Jan. 3, 1902, for the removal of diseased uterine adnexa. The patient took cloroform well, about 175 grams being used. During the day the patient was excited and restless, and gained complete consciousness only once. There was slight vomiting after anesthesia.

January 4: She had a sleepless night, tossed about in bed, and finally was restrained by nurse. The evening temperature, 38 C.

January 5: Patient slept a great deal, talked with nurse at times, and was conscious.

January 6: Jaundice was noted. At half-past 8 the patient suddenly became very restless and delirious. She tossed about

* Read in the Section on Surgery and Anatomy of the American Medical Association, at the Fifty-sixth Annual Session, July, 1905.

17. Erlach: Personal communication to Bandler.

18. Martin, G.: "Ueber todtliche Chloroform nachwirkung," Berl. klin. Wochft., 1896, xxxiii, p. 204.

19. Mintz, W.: "Akute gelbe Leber atrophie als Komplication v. Epityphilitis zugleich ein Beitrag. z. Frage der postoperativen Magen-Duodenal Blutung." Mittell. aus den Grenzfiebelt der Med. 1900, vi, p. 645.

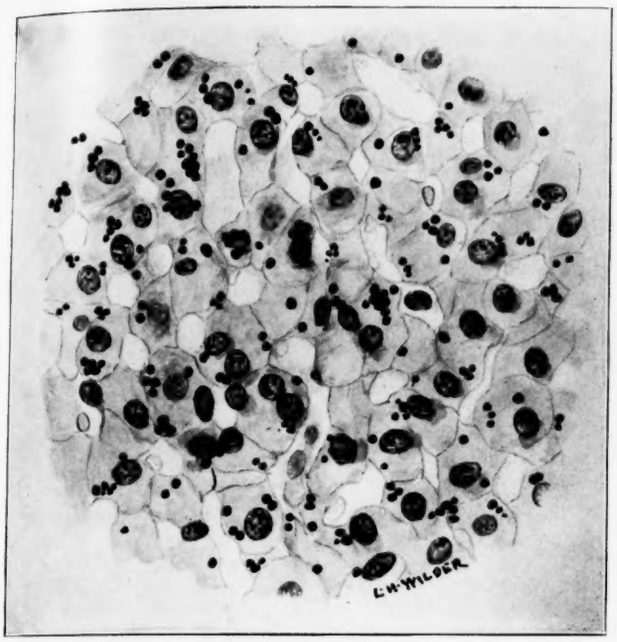


Fig. 2.—Section of liver of healthy rabbit, showing the amount and distribution of fat in the liver cells. Fat globules are represented by the heavy black. Drawing made from a frozen section, stained with Sudan III and Delafield's hematoxylin.

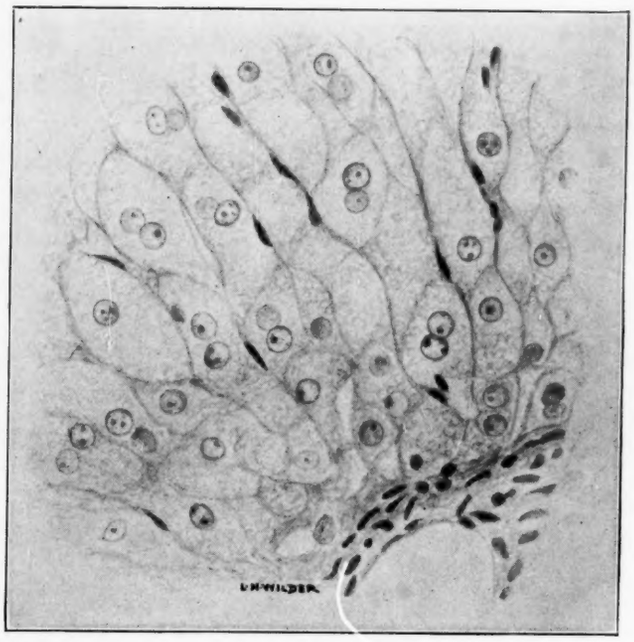


Fig. 4.—Section from liver of rabbit, which had been chloroformed for two hours and killed forty-eight hours later, stained with hematoxylin and eosin. The liver cells are swollen and vacuolated, the fat droplets having been dissolved out during the process of embedding. The nuclei stain poorly, the chromatin network having been partially destroyed. In some cells karyorrhexis is well advanced.

Fig. 3.—Section of liver of a rabbit, which had been chloroformed for two hours and killed forty-eight hours later. The rabbit became drowsy about twenty-four hours after the anesthetic, refused food and was partially paralyzed in the forelegs. The liver presented the typical appearance of fatty degeneration. Drawing made from a frozen section stained with Sudan III and Delafield's hematoxylin. Fat is represented by the heavy black. Fatty degeneration of the liver cells is marked; the fat droplets are grouped about the periphery of the liver cell and are separated from the nucleus by a clear, unstainable, degenerating cytoplasm. The fatty changes are found throughout the lobule, and are not confined to any particular zone.

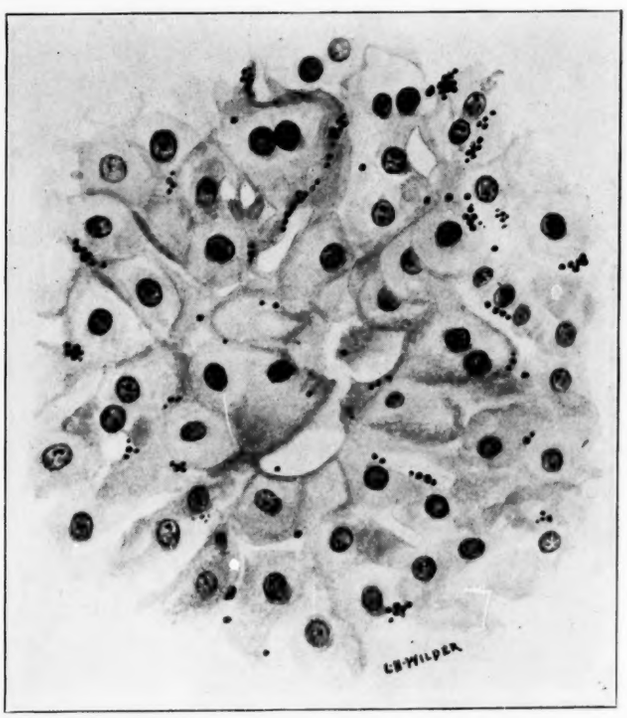


Fig. 5.—Section of liver from a rabbit, which had been etherized for two hours and killed seventy-two hours later. The animal was not sick after the anesthetic. The liver was macroscopically normal. The fat does not exceed in amount the fat found normally in the liver. It should be noted, however, that the greater part of the fat is intercellular, whereas in the normal liver it is intracellular.

in bed and cried with fright, and had to be forcibly restrained. Sleep was induced by chloral and morphin.

January 7: The patient became deeply comatose. Face reddish, cyanosis, conjunctivæ icteric; pulse small and frequent, 150. Death occurred at 8:30 p. m.

Anatomic Diagnosis.—Cloudy swelling of heart, liver and kidneys. Icteric nutmeg liver.

G. E. Brewer,[2] in 1902, reports the following case:

Patient.—S. S., schoolboy, aged 12, was admitted to Roosevelt Hospital, April 29, 1901. Two days previously he had been seized with acute abdominal pain, accompanied by nausea and vomiting. There was slight elevation of temperature and increased pulse rate. Previous health was good.

Operation.—April 29, 1901: A perforated gangrenous appendix was found in a small abscess and removed. Anesthesia produced by chloroform lasted about twenty-five minutes. The second night after the operation was a comfortable one, and the following morning temperature was normal, pulse 76. During the day the temperature remained normal and pulse did not rise above 80.

Postoperative History.—The following night (third) he slept well until shortly after midnight, when he awakened suddenly without apparent cause and uttered an agonizing, piercing shriek expressive of terror. He failed to recognize people about him; he soon fell asleep, and rested quietly until morning. He was somnolent on the following morning. When aroused he would cry out and appear much frightened. Temperature 98.5, pulse 74. He was seen by Dr. Brewer at about 11 o'clock, and when awakened he screamed so loudly that he could be heard over the whole building and was the picture of abject terror. The paroxysms lasted from a few seconds to two or three minutes. There were no symptoms on part of nervous system. Consultation was held. Peculiar sweetish odor of breath was noted. At 6 p. m. temperature was normal; pulse during day was 80. Acetone and diacetic acid were found in the urine.

At 8 p. m., 400 centimeters of blood were withdrawn from median basilic vein, and 1,000 c.cm. of normal salt solution, to which were added 15 grams of chemically pure sodium bicarbonate were injected. The paroxysms of screaming became shorter and occurred less frequently. Circulation in extremities was slower; face became slightly cyanotic and eyes expressionless. Between 4 and 5 a. m. the condition began to grow worse. Respirations became shallow and rapid. The pulse was weaker; temperature rose rapidly to 103 F., and deep and progressive coma developed. Death occurred at 11 a. m. No autopsy.

Ballin,[20] 1905: Dec. 9, 1901: Appendectomy was done on a young man, aged 20 years; lead poisoning was a possible predisposing cause, under chloroform anesthesia. A small amount of chloroform was used.

Dec. 10, 1901, 9 a. m.: Temperature normal, pulse 100, patient restless and nauseated. Urine was drawn by catheter.

December 11: There was slight jaundice of skin and conjunctiva and slight vomiting several times. He was somewhat restless in the afternoon. Temperature 97.6 F., pulse 88. The jaundice increased; patient was restless and slightly delirious in the evening. There was vomiting of greenish fluid at 5 p. m.

December 13, 8 a. m.: Temperature 98 F., pulse 86; patient was delirious all night and was noisy; he slept at short intervals; he was apparently in deep coma at these times. He threw his arms and legs about wildly and was violent. By this time he presented the classical symptoms of acute yellow atrophy.

December 14: Temperature 100.4, pulse 108. Delirium and coma seemed to increase. Gradually there was subsidence of symptoms; patient was discharged from hospital on February 11.

Ballin discusses in this paper the possible relation to chloroform anesthesia and to toxins from diseased appendix.

20. Ballin, Max: "Acute Yellow Atrophy of the Liver as a Sequela to Appendectomy." Ann. of Surg., 1903, xxxvii, p. 362.

Guthrie,[21] in 1903, reported the following cases:

CASE 1.—Woman, aged 41, was admitted to Glasgow Royal Infirmary on October 29, 1897. She had a tuberculous knee, from which she had suffered for the past twenty-seven years. During the past four years she had had occasional attacks of gallstone colic. Otherwise her health was good. The limb was put in carbolic acid dressings preparatory to operation. After twenty-four hours the patient vomited bile-stained matter; urine was greenish, becoming darker on standing. The dressings were immediately removed, but the patient remained seriously ill for eight days. After subsidence of vomiting, she remained well for nearly three weeks; urine was free from albumin and casts.

November 24: The knee was excised under chloroform. During the night, vomiting commenced and increased; nothing would stop it. Afternoon of November 26 patient was drowsy. At night she could not be aroused to answer questions. Urine was passed in small quantities and contained casts. She died comatose, November 27, three days after operation.

Autopsy.—Liver was markedly fatty. Heart was small, but musculature healthy. Kidneys were fatty, with some interstitial nephritis. Spleen was normal.

CASE 2.—Boy, aged 3, admitted under care of Mr. Burghard, for webbed fingers and toes, April 6, 1903. Patient was healthy looking and well nourished. Described as "dyspeptic," subject to "bilious attacks," "night terrors," and very passionate.

Operation.—April 7, at 3 p. m., webs between second and third fingers of each hand were divided under chloroform. Operation lasted twenty minutes. Chloroform was taken well.

Postoperative History.—On April 9 patient was slightly sick, drowsy and apathetic. On the afternoon of the same day, he became slightly, but distinctly, jaundiced. In the evening, he began to scream loudly, the screaming occurring in fits and paroxysms; he was seemingly semi-conscious. There was possible slight tenderness in liver region. Liver was slightly enlarged. Urine was passed involuntarily. Screams of shrill meningitic type continued until after 3 a. m., when they ceased after administration of chloral and bromids.

April 10: He lay in a practically unconscious state. Jaundice was about the same as on previous day. Liver could be felt two fingers' breadth below the ribs. Leucin and tyrosin were not found in urine. Toward night he became comatose. The conjunctival reflexes were lost. There was slight lateral nystagmus, especially in the left eye, with a tendency in both eyes to turn upward. Respirations were loud, quick, but not typical Cheyne-Stokes. Death occurred at 2:45 a. m. on April 11; 84 hours after the operation. Temperature was between 97 and normal throughout.

Autopsy.—Liver weighed 1 pound 12 ounces; pale and fawn-colored.

Microscopic Examination.—Osmic acid preparations showed a ring of fatty cells, occupying the outer zone of each lobule; intermediate zone, a few fatty cells; none in inner zone. Cloudy swelling and fatty degeneration. Small petechiæ were found in pleuræ. Brain, meninges, kidneys, suprarenal capsules, spleen and intestines were normal.

CASE 3.—Healthy-looking female child, aged 1 year and 10 months, was admitted to the Children's Hospital, Paddington-Green, under care of Mr. Burghard, February 24, 1898. Partial removal of nevus had been made in June of previous year. At 10 a. m., February 25, Mr. Burghard removed remaining portion of nevus under chloroform. The operation lasted twenty minutes. Carbolic acid was used only in strong mixture to purify skin at beginning of operation. Wound was dressed with cyanid gauze.

Postoperative History.—At 4:30 p. m. the child was slightly nauseated. Temperature, 9 p. m., 102. Child slept well during night; at 5 a. m. she awoke, restless and nauseated; at 7:15 a. m. she was restless, somewhat cyanosed, conscious, Pulse was feeble and rose to 136 and 160. At 11 a. m. the

21. Guthrie, L. G.: "Some Fatal Effects of Chloroform on Children Suffering from a Peculiar Fatty Condition of the Liver." Lancet, 1903, II, p. 10.

child vomited dark colored matter. At noon she became unconscious, though still restless and thirsty. At 2 p. m. there was a slight general convulsion. Saline injection was given. Death occurred twenty-eight hours after operation. Pulse was 160, temperature 106 at time of death.

Autopsy.—Liver weighed 13 ounces. Slight increase of fibrous tissue along portal canals. It was preserved in alcohol, preventing good demonstration of fat, but is reported as "undoubtedly fatty in places."

CASE 4.—Girl, aged 3. Dr. Lack opened postpharyngeal abscess from behind sternomastoid. Chloroform was taken well. The operation lasted from ten to fifteen minutes. Twenty-four hours later the child appeared well, but was often nauseated. Temperature was 102 F. At 8 p. m., thirty-three hours after operation, the child had a "cold fit;" there was some shivering and extremities were blue and cold. Temperature rose to 107. Death occurred one-half hour later. Carbolic acid was used at operation, but no carboluria had developed. No autopsy was permitted.

E. G. Brackett,[3] in 1904, J. S. Stone and H. C. Low reported the following:

CASE 1.—M. J. B., girl, aged 8, entered Children's Hospital October 6, 1903. There was extensive infantile paralysis involving most of the muscles of both lower extremities. During preceding year frequent attacks of severe and persistent vomiting, accompanied by marked prostration and rapid pulse, closely resembling condition existing first day of fatal one, may have been predisposing causes.

Operation and Postoperative History.—Oct. 10, 1903: The child was etherized and three tendons were transplanted. She took ether badly, was cyanotic and had rapid pulse. During recovery from ether the child vomited and then seemed comfortable and in good condition for twelve hours. She suddenly began to vomit; the pulse became rapid; rose to 190, and temperature to 106. Vomiting lasted about thirty hours. The child passed from restlessness into a delirious stupor, and died forty-two hours after operation, thirty hours after vomiting began. No test was made for acetone and diacetic acid in this case, but it was later recalled that the breath had a peculiar sweetish odor.

Autopsy.—Liver weighed 510 grams. Surface was smooth and irregularly mottled with yellowish areas from 3 to 5 cm. in diameter, scattered over a reddish-brown surface. Cross-section, yellowish-brown in color. Microscopically, sections of liver, spleen, kidneys and lung were negative.

CASE 2.—Girl, aged 5½ years, entered Children's Hospital, November 16, 1903. Infantile paralysis, four years before, and contracted fasciæ, causing permanent flexion of the thighs. A slight trace of diacetic acid was present in urine.

November 17, 1903: Fasciæ at upper and outer part of each thigh were divided, open method. Operation was short, little ether being used.

Postoperative History.—At 11 p. m., thirteen hours after operation, she vomited a small amount of dark brown thin fluid; during the next ten hours she vomited several times. She slept in all three hours. When awake she was very restless and noisy. Twenty-four hours after operation the condition of patient was very poor. Extremities were cold; pulse weak and rapid; expression anxious; sweet odor of breath noticeable during morning. Twenty-six hours after operation 5 ounces of urine were passed, containing large traces of acetone and diacetic acid. Thirty hours after operation the child became delirious. Pulse was very weak. Thirty-six hours after operation, 12 ounces of 2 per cent. bicarbonate solution were given intravenously; also under each breast. On second morning following operation, child became dull and apathetic; she gradually lost consciousness and coma supervened. Odor of breath became more pronounced. Cyanosis was marked during last few hours. Temperature after operation remained at about 102.

Autopsy.—Liver surface smooth, and pale yellow; in places reddish color. Cut surface, pale yellow; oily and homogeneous. Fresh examination showed marked fatty infiltration. Kidneys, fatty infiltration.

CASE 3.—Girl, aged 4, entered Children's Hospital, February 15, 1904, with double congenital dislocation of both hips. Right hip had been reduced five months previously under ether. Urine was acid, free from sugar and albumin. Three days after entrance to hospital patient was etherized, and in manipulating both femurs were broken.

Postoperative History.—Child was under ether between one-half and three-quarters of an hour. She recovered from the ether as usual. In the evening, pulse was weak and rose to 150. Twenty hours after operation, pulse became suddenly weak and rapid; the color was poor. The child seemed dull; no vomiting. Breath was sweet. Acetone and diacetic acid present in urine. During the day, the child grew rapidly worse and sank into restless coma; lips blue in spite of oxygen; drawn expression of face; eyes became sunken. At 6 p. m. salt solution was injected under both pectorals, followed by marked improvement in pulse and color. Temperature was 104; at 9:30 p. m. the child was able to recognize her mother. At midnight the condition grew rapidly worse. Temperature rose to 106 at 3 a. m. Coma returned. Child died at 5:30 a. m., twenty-three hours after first collapse, forty-three hours after operation.

Autopsy.—Liver large, pale yellow, with a pink color in places. Cut surface pale yellow; lobules indistinctly marked. Knife edge scraped up fatty material. Tissue broke easily on pressure. Kidney, considerable fat in epithelium of convoluted tubules.

Kelly,[22] in 1905, reported the following case:

Patient.—Schoolboy, aged 9. Service of Dr. H. W. Cushing. Operation, May 16, 1904, for appendicitis. Ether anesthesia. The condition of the appendix did not account for the patient's serious condition, so the abdomen was explored and nothing found. A sterile gauze wick was inserted into pelvis and to stump of appendix, and abdominal wound was closed. An area about 1 centimeter in diameter of slight edema and redness was found about 2 cm. from the tip of the appendix. The appendix contained a grape seed. The patient's general condition so grave that 250 c.c. (1-50,000) adrenalin salt solution were given. He was restless after operation. Urine was negative before operation.

Postoperative History.—May 18: Sweetish odor of breath continues. Patient mildly delirious and drowsy. Urine contains acetone and diacetic acid. Vomiting continues.

May 22: General condition markedly improved. Still occasional vomiting. Acetone and diacetic acid present in urine. No delirium, but patient is drowsy and resists daily dressing.

May 26: Occasional vomiting. Expression dull. Patient sleeps most of time; refuses everything by mouth. Acetone and diacetic acid in urine. Patient slowly failed, and in spite of active stimulation died at 11:05 p. m.

No autopsy. Examination of liver during operation was negative.

REVIEW OF SYMPTOMS.

The symptoms appear in from 10 to 150 hours after the anesthesia. The average of Guthrie's first series of ten cases being 37½ hours.

In Brewer's case, a boy of 12, following an operation for appendicitis lasting twenty-five minutes under chloroform, nothing unusual was noted immediately after. The second night following the operation was a comfortable one. He slept six hours; the next day his pulse was 76, and temperature normal. He was cheerful, happy, had no pain, and was hungry.

The following night, he slept quietly until shortly after midnight, when he suddenly awakened and without any apparent cause uttered a piercing shriek, which alarmed his nurse and mother. He continued to scream for several minutes, looked wildly about him, and apparently failed to recognize those around him. A few moments later he fell asleep and rested quietly until morning. The following morning he was distinctly somnolent, when aroused would cry out and appear frightened, but could easily be soothed by his mother.

22. Kelly, Jas. A.: "Acid Intoxication: Its Significance in Surgical Conditions," 1905, xii, p. 161.

At 11 in the morning he awoke and again uttered an agonized cry. He continued to scream, so that he could be heard all over the building. Delirium was followed by coma. The face seemed slightly cyanosed; acetone and diacetic acid were found in the urine and blood. Death. No autopsy.

Brewer discusses the case and comes to the conclusion that it was an autointoxication, and considers ptomain poisoning, uremia and acetonemia, and concludes that acetonemia was the cause of death.

Brewer describes the three characteristic symptoms, as sweetish odor of the breath, delirium and rapidly fatal coma. Another symptom is that of air hunger, described by Kussmaul, evidenced by deep breathing and a bright red color of the mucous membranes (this was noted in our case), Cheyne-Stokes respiration and cold extremities.

Brackett, Stone and Low describe the following symptoms: Vomiting associated with collapse; a very weak and rapid pulse; an absence of fever until just before death; cyanosis in the fatal cases, causing extreme dyspnea; apathy and stupor alternating with periods of restlessness, at first, but in the fatal cases gradually deepening into coma and death; and the presence of acetone in the breath and urine.

Stocker describes the symptoms in his case as follows: The morning of the second day after the operation the patient, who had been doing well, became very restless, threw herself about in the bed, but mind was at first clear. The next day coma and death.

Guthrie says of symptoms:

> After recovery from the immediate effects of the chloroform there was usually an interval of a few hours at the end of which the child would begin to utter piercing cries at short intervals, disturbing the whole building by its shrieks, grinding its teeth, tossing, struggling and requiring constant attention lest dressings be torn off or fractured bones displaced. The pupils were often dilated, sometimes unequally, the face being flushed or pale, with a look of wild terror and anxiety. Consciousness was sometimes lost early and never regained; sometimes there were intervals in which the child would be dull and apathetic, but would answer rationally when addressed, and usually deny being in pain. Vomiting was a marked feature in all but one case. It was copious, frequent, persistent and the vomited matter sooner or later almost exactly resembled the dregs of beef tea.

In eight out of ten cases, the symptoms of a marked cerebral type were present, resembling maniacal delirium.

Temperature (10 cases): In 1 case it rose to 103 four hours after operation, and remained there throughout. In 2 cases it rose to 103.2, and 104.6, just before death. In 1 case it remained between 98 and 99. In 6 cases it varied from 99 to 102.

Two cases suggested meningitis, running unusually acute and rapid courses; except for absence of jaundice and hemorrhage, they might have been diagnosed as "acute yellow atrophy."

In Kelly's cases there was apathy, alternating with restlessness, vomiting occurring without apparent cause, following immediately on taking anything into the stomach, coma and death. The pulse was increased in rapidity, of decreased tension, and in some cases became very weak. Fever was absent except in severe cases, when the temperature would rise to 102 or 103. The face alternately pale or flushed, was at times expressive of great anxiety.

PREDISPOSING CAUSES.

Age, 1 to 10 years, 17 cases; 11 to 20 years, 3 cases; 21 to 30 years, 1 case; 31 to 40 years, 2 cases; 41 to 50 years, 2 cases. Age not mentioned in 5 cases.

Sex: Male, 9 cases; female, 18 case. Sex not mentioned in Bastianelli's three cases.

Possible predisposing or accessory causes are, alcohol, lead, carbolic acid, mercurial and iodoform intoxication. Other causes are homesickness, fright, change of food (Brackett, Stone and Low), intestinal fermentation and putrefaction; extensive fatty changes associated with infantile paralysis; starvation; sepsis. In pregnancy, in the presence of a dead fetus; the existence of a gangrenous mass, diabetes, carcinoma, anemic states from any cause and hemorrhage are also to be considered.

POSTMORTEM FINDINGS.

Liver: Fatty degeneration or infiltration occurred in 16 cases; acute yellow atrophy in 3 cases; icteric nutmeg liver in 1 case; no distinct liver changes mentioned in 4 cases; recoveries in 2 cases; no autopsy in 4 cases; total, 30 cases.

CHANGES IN OTHER ORGANS.

The following changes were noted in other parts of the body: Fatty degeneration of heart; different grades of nephritis; fatty degeneration of muscles of lower limbs; considerable venous congestion of brain; pyelitis; tuberculosis of bronchial lymph nodes and vertebræ.

CONCLUSIONS.

From the analysis of clinical and laboratory reports bearing on this subject, we believe that we are warranted in the following conclusions:

1. Anesthetics, especially chloroform (ether to a very limited degree), can produce a destructive effect on the cells of the liver and kidneys and on the muscle cells of the heart and other muscles, resulting in fatty degeneration and necrosis, very similar to the effects produced in phosphorus poisoning.

2. The constant and most important injury done is that to the liver.

3. This injury to the liver cells is in direct proportion to the amount of the anesthetic employed, and the length of the anesthesia.

4. Certain individuals exhibit an idiosyncrasy or a susceptibility to this form of poisoning which it is difficult to explain.

5. There are certain predisposing causes which favor this destructive effect of chloroform, among which are, (a) age—the younger, the more susceptible; (b) causes which lower the general vitality of the individual and probably the vitality of the liver cells, such as diabetes, previous recent anesthesias, infections from pus germs, diphtheria, intoxications from a dead fetus in the uterus, a gangrenous mass in the abdominal cavity, etc.; (c) exhaustion due to hemorrhage; (d) exhaustion due to starvation; (e) exhaustion due to wasting diseases, such as carcinoma; (f) lesions which have resulted in extensive fatty degenerations, such as occur in the limbs in infantile paralysis; (g) chronic diseases involving both liver and kidney, such as cirrhosis and nephritis.

6. As a result of this fatty degeneration and necrosis of the liver cells, toxins are produced either from the liver cells themselves or as a result of the failure of these cells to eliminate substances which, under normal conditions, they eliminate, but which under these abnormal conditions they fail to do, and these substances, therefore, may accumulate and produce toxic effects.

7. These toxins produce a definite symptom-complex which makes its appearance from 10 to 150 hours after the anesthesia. This symptom-complex consists of vomiting, restlessness, delirium, convulsions, coma, Cheyne-Stokes respiration, cyanosis, icterus in varying degree, and usually terminates in death.

8. It is probable that milder degrees of this poisoning are recovered from, and that the transient icterus noticed after chloroform anesthesia without other evident cause is due to such poisoning, and many cases which exhibit restlessness, fright, mild delirium, drowsiness, etc., after anesthesia may be due to the same cause.

9. This disease is an hepatic toxemia; the toxins producing it hepatic toxins; and possibly the previous condition making its development easily possible should be described as liver insufficiency. Just as we have for a long time recognized a condition, uremia, in which we find arising from a variety of noxious agents, anesthetics, poisons, infections, pregnancy, etc., affecting the secreting cells of the kidney and preventing their normal function, a pathologic condition, accompanied with a certain definite symptom-complex; so we must now, we believe, recognize a condition involving the liver in which we find from a variety of noxious agents (anesthetics, poisons, infections, pregnancy, etc.), affecting the secreting cells of the liver and preventing their normal function, a pathologic condition which we must describe as hepatic toxemia, accompanied with a certain symptom-complex, and showing certain changes postmortem.

We believe that the condition of acute fatty degeneration of the liver with resulting hepatic toxemia is as definite a pathologic entity as is acute pancreatitis with fat necrosis.

10. As by-products in this toxemia, but not as the essential poisons, are found acetone, diacetic acid and betaoxybutyric acid in the blood and urine.

11. Postmortem reveals fatty degeneration of the liver, fatty degeneration and mild degree of inflammation of the kidneys, and, in extreme cases, fatty degeneration of heart and other muscles. The lesion of the liver, we believe, to be the overshadowing and important one, and the one which is responsible for the symptoms and fatal result. The injury to the liver, in some cases, is so great as to result in practically a total destruction of the organ.

12. Somewhat similar hepatic toxemias resulting from fatty degeneration of the liver cells occur in other conditions, and are accompanied with very similar symptoms. In such conditions as phosphorus poisoning, diabetes, puerperal eclampsia, acute yellow atrophy of the liver.

13. This fatty degeneration of the liver with hepatic toxemia following anesthesia is almost invariably due to chloroform in the fatal cases. Ether is seldom the cause of a death of this kind.

14. This serious and even fatal late effect of chloroform which has heretofore not been generally recognized must still further limit the use of this powerful and dangerous agent.

15. The possibility of the development of hepatic toxemia makes chloroform distinctly contraindicated in those cases in which there exist the conditions which seem to favor its development, i. e., diabetes, sepsis, starvation, hemorrhage; the presence of intoxication from dead material; the presence of fatty degenerations, as already cited, after infantile paralysis, and lesions of the liver. The susceptibility of children to this hepatic toxemia must be recognized. That chloroform is capable of producing these serious late poisonous effects is a strong argument against its employment, and an argument in favor of the more general use of ether; and yet we are confronted at times with the Charybdis of ether pneumonia, on the one hand, and the Scylla of chloroform hepatic toxemia, on the other.

16. The recognition of this danger of hepatic toxemia is a strong argument against the employment of chloroform for long anesthesia, as it can be shown that a two-hour chloroform anesthesia is almost invariably fatal to rabbits and guinea-pigs, from fatty degeneration and necrosis of the liver cells; and a two-hour chloroform anesthesia in man is an exceedingly dangerous thing.

17. These facts in regard to the late poisonous effects of anesthetics and the fact that the dangers increase with the amount of the drug employed, and with the length of the anesthesia form a strong argument in favor of rapid operating and in favor of limiting in every way possible the length of the anesthesia and the dose of the anesthetic. For example, time-consuming preparations of the patient should be made before, not after, anesthesia. In the light of this present knowledge, no surgeon can claim, as some have in the past, that after the patient is once asleep, that it makes no difference whether it requires one hour or two hours for the doing of an operation. In the light of this knowledge, for instance, three-hour breast amputations with the unnecessary ligation of fifty vessels, becomes bad surgery.

18. This problem seems to us a very important one, and worthy of the most careful study and research. At present, we are practically limited to chloroform and ether as general anesthetics. Each has its danger; each has its special field in which one is safer than the other. We have, as a rule, heretofore, employed chloroform in cases in which there was a previous lung or kidney lesion, and in children, with the idea that it was less likely to produce nephritis and pneumonia, and have used ether in the bulk of our work and felt that it was specially to be selected in heart lesions. We must now add new limitations, and attempt to determine by previous examination whether there is what might be called hepatic insufficiency, the conditions present which favor the development of the late poisonous effect of chloroform on the liver. Another way of solving this problem would be the discovery of new anesthetic agents, which do not carry with them these poisonous effects, or the employment of the present anesthetic in such a way as to avoid these dangers.

For instance, it has been suggested that chloroform and oxygen combined would prevent the poisonous effects of chloroform alone, and there is some evidence to support this view. This should be determined by special research.

Again, nitrous oxid and oxygen combined can be employed for long anesthesias, and experience may show that this mixture may prove to be very much safer than chloroform and ether. Although at present there is not enough evidence on which to base such a claim, in this connection I would cite the fact that the anesthetist in Dr. Bevan's surgical clinic, Dr. F. B. Moorhead, has found that after prolonged anesthesia with gas there is a marked decrease in the amount of hemoglobin, apparently a rather serious destructive effect on the blood, which may limit the use if this mixture.

In conclusion, we believe that the dangers of late chloroform poisoning must be more generally recognized and understood; that the lessons from this study are the dangers of long chloroform anesthesias and chloroform anesthesias in patients suffering from the conditions which we cited favored its development; and, we must recognize the susceptibility of children to this form of poisoning. The problem of how to prevent these deaths confronts us unsolved. We have taken the first step in its solution, for we now recognize the cause of these deaths. We must work and find some way to prevent the occurrence of these serious and fatal accidents.

DISCUSSION.

DR. HERBERT C. MOFFITT, San Francisco, stated that during the last three years he has seen in consultation six cases similar to the one reported. In each instance there had been some previous affection that might render the liver insufficient. One man had gummata of the liver, with gallstones. A woman had gallstones with frequent attacks of cholecystitis. A child had an attack of catarrhal jaundice some months before an operation under chloroform for mastoid disease. A young woman had had malaria for years, with enlarged liver and spleen, before she was operated on for acute appendicitis. Another young woman had had catarrhal jaundice some weeks before an exploratory laparotomy was done under chloroform. In four of the cases there was the clinical picture described by Dr. Bevan. It has been Dr. Moffit's rule of late, in view of such experience, to forbid the use of chloroform in any condition of suspected hepatic insufficiency.

DR. HARRY M. SHERMAN, San Francisco, said that Dr. Bevan has possibly explained something that puzzled him in a patient some time ago. A girl after an operation suffered from persistent vomiting and some jaundice with almost suppression of urine. One day the urine would contain casts with no albumin, and the next day albumin but no casts. Naturally Dr. Sherman thought there was some postoperative nephritis. To stimulate the kidney function he used salt solution under the skin, and the symptoms, including the vomiting, stopped and the patient began to take food, but the urine was not increased in quantity. Evidently it was not a case of nephritis and may not unlikely have been one that would fall into the class described by Dr. Bevan.

DR. WOODS HUTCHINSON, Portland, Ore., declared that the greater frequency of the occurrence of this condition in children is probably due to the fact that physicians have always thought it perfectly safe to use chloroform in children. It also probably explains the unexpectedly bad results that sometimes follow operations for gallstones, the liver being already disabled and unable to resist the attack of the anesthetic. The liver, Dr. Hutchinson said, is a poison filter and reduces toxins in the blood both from the portal and general systems. These toxins are changed into the harmless excretion, bile. The liver certainly is the organ which first fails in puerperal eclampsia, probably in most cases of Bright's disease, and is beginning to attract suspicion even in acute infections like pneumonia. In chronic poisoning by alcohol, arsenic or phosphorous the liver acts as chief protector of the system and first shows the result of the attack in cloudy swelling and cirrhosis. No matter what the disease, our patients die with one familiar group of symptoms—headache, convulsions, blindness, coma, Cheyne-Stokes respiration, which is called "uremia"—because urea is precisely the one substance which the liver is unable to form and hence is present in the blood in less amounts than usual. Uremia is the syndrome of liver failure. Just as long as the liver can destroy the toxins just so long the system will be able to resist.

DR. OTTO S. BINSWANGER, Portland, Ore., agreed with Dr. Bevan that death in chloroform poisoning is due to degeneration or death of the liver cells. Dr. Binswanger said that considering the part played in diabetic coma by oxybutyric and diacetic acids, he is inclined to believe that these acids may be responsible to some extent for the fatal results in these cases. In diabetes, he said, these acids cause an acidosis or a reduction in the alkalinity of the blood. They neutralize to some extent the carbonate of potassium or sodium. The carbonates are the chief agents for the removal of carbon dioxid. They are converted into bicarbonates, which in turn are broken up in the lungs into normal carbonates again and carbon dioxid, which latter substance is exhaled. If the quantity of carbonate of potash is reduced by the presence of oxybutyric and diacetic acid, naturally its functions as a carbon dioxid carrier will be reduced. The carbon dioxid will accumulate in the blood and give rise to carbon dioxid poisoning; exactly what happens is diabetic coma.

DR. D. A. K. STEELE, Chicago, reported one additional case of this comparatively rare condition. Two years ago he was called to see a girl aged 12, who was suffering from an acute attack of appendicitis. She had suffered an acident two weeks before by falling down stairs and fracturing both bones of her left forearm. The fracture was reduced under chloroform anesthesia. Dr. Steele had her removed to the Chicago Hospital and operated on her on the third day of her attack of appendicitis, finding an intensely inflamed and adherent appendix buried in a mass of lymph exudate, but not perforated. Chloroform was the anesthetic used during the operation. Everything went along normally for three days, when she began to be restless, delirious, and developed the classical symptoms referred to by Dr. Bevan. At the time of her death Dr. Steele attributed it to actonemia, but now he is convinced that it was a case precisely similar to the one described by Dr. Bevan.

DR. A. D. BEVAN said that Dr. Binswanger is quite correct in attributing certain results to acidosis. The primary cause is the destruction of the liver cells with the liberation in some way of a toxin which produces this symptom complex. Acetone and diacetic acid are to be regarded not as the essential cause, but as by-products in the pathologic process.

THE PRINCIPLE OF LIFE.*

MARSHALL LANGTON PRICE, M.D.

BALTIMORE.

> "The days of our age are three score years and ten; and though men be so strong that they come to four score years, yet is their strength then but labor and sorrow, so soon it passeth away and we are gone."

To many of us who travel along the level, but somewhat narrow pathway of scientific research, there doubtless comes the desire, to leave its beaten surface and to stray in those bordering fields where fact and fancy are so delightfully intermingled; where the skies are always blue, the sunshine bright, and the flowers fresh and blooming; where substance appears as shadow and shadow substance and our pet hobbies, viewed with our indulgent paternal eyes, seem beautiful and spirited thoroughbreds. In this land, we can appropriately ask, in the words of the cynical Roman Governor of Judea (freed from the rigid limitations which science imposes), "What is truth?"

An excursion into these fields is not without benefit, even to the hard-headed man of science, and we have a precedent for invading the territory usually considered the exclusive possession of the poet, the artist, and the musician, from the highest possible source. M. Metchnikoff has recently made an excursion into this fascinating country and among the pebbles which he has gathered on its shores are a number of precious stones, which can not fail to add lustre to the crown of a man already a ruler in the field of scientific research.

I have chosen to-day (rather than to attempt the dif-

* Read in the Section on Hygiene and Sanitary Science of the American Medical Association, at the Fifty-sixth Annual Session, July, 1905.

ficult, if not impossible task of adding to this session on water, which has already been so fully and ably discussed) to consider some of those elementary principles affecting human life; always so near to us as hygienists; as a sort of *confession fidei*, if I may be allowed to make such for this congregation.

As the faithful in the three Catholic religions never part company without the confession of faith contained in the Nicene or Apostolic creed, so it seems to me proper that we should not separate in our annual meetings without reiterating some of those elementary principles which underlie our endeavors. (A practice which I commend to the consideration of our future officers.)

The primary objects on which our complicated sanitary procedures are built are, after all, the preservation and lengthening of human life; or, the problem of hygiene stated in biologic form, is the preservation, conservation and increase of those metabolic functions of the cell, the resultant of whose sum total we recognize as the phenomenon of life. We can properly leave in other hands the equally important objects of human usefulness and happiness.

I have endeavored to-day to analyze some of these elementary principles connected with a problem, obscure, but of vital interest, and in their consideration to attempt to open a door which has remained closed for over 8,000 years of human history. This problem concerning which are probably the most important and interesting of Metchnikoff's recent investigations, is that of "age," perhaps the most mysterious and insoluble of the problems with which human philosophers have attempted to deal. The question, Why should a man die? is only secondary in importance to the centuries old question of Job, "If a man die shall he live again?"

M. Metchnikoff may be credited with being the first scientist who has directly investigated this problem and who has given us anything bearing on its causation. The discordance of even the tentative theory which he pronounces will appear in the further analysis of the biologic principles connected with senility.

In the investigation of this problem, Metschnikoff has made examination of the tissues and cells of numerous men and animals who have died at advanced years. He ascribes the failure of function which we recognize as age to the inability of the highly differentiated cells to resist the action of the phagocytes which he has found, particularly in the nervous tissues, to attack the former and to destroy them by the usual digestive activities. It will be noted that this deficiency of the aged cell which M. Metschnikoff has observed—though of the utmost importance in the fate of the organism—is merely one of the defects, of which there are probably many, inherent in the senile cell, and its presence there does not explain the important problem of why the aged cell should be deficient at all; and it is difficult, indeed, to conceive, why the one-thousandth or ten-thousandth descendant of a cell should be less able properly to perform its function than the one-hundredth or five-hundredth descendant.

From our present knowledge, we can only advance three theories that would properly account for the condition known as senility in an animal organism:

First, that the failure of the cells is due to successive and repeated inflammations, and that as a result of this action of pathogenic organisms and toxins the specific cells are destroyed and are replaced by connective tissue cells, with the formation of fibrous or scar tissue, which, of course, is unable to perform the functions of the cells which it replaces.

Second, that the failure of the cell is a nutritive one, the cell becoming unable with the advance of time, to maintain and to continue those metabolic processes which are required of it in the performance of its special functions.

Third, that the failure of the cell is due to the loss of the properties which enable it to resist and to overcome the constant activities of pathogenic organisms and toxins.

If we accept the first hypothesis we must believe, other things being equal, that the functioning power of the organism is to be measured wholly by the number of cells which it contains capable of performing their specific metabolic functions, that the physiologic age of the organism will depend in turn on the number and extent of the inflammatory and toxic processes to which it has been subjected. That this substitution of functionating cells by connective tissue cells in the form of a fibrous reticulum or scar is a decided factor in the "age" of the organism there can be no doubt, but the hypothesis that it is the only condition connected with what we know as old age, is open to numerous objections.

In the first place, we would expect to find those organisms which had undergone repeated general inflammations always more advanced in the period of physiologic age than other organisms of the same years, not subjected to the results of inflammations or toxemias—a supposition not in accord with the general clinical experience of the present generation.

Second, we find the changes incident to age in certain organs and tissues which, so far as we can ascertain, have undergone neither inflammations nor toxemias. For example, in the skin of the old man we find an atrophy, a loss of elasticity, and a tendency to malignant and other morbid proliferations which are evidently independent of inflammatory or toxic influences; nor do the commonly recognized inflammations of the skin seem to have any influence in producing these degenerative changes.

The third and most forcible objection to accepting this hypothesis (and probably the most characteristic deficiency of the senile cells) is the loss of the power of reproduction and regeneration. This regenerative deficiency can not have any relation to local or general inflammation, and the general rule seems definite for all organisms of the same species: *The regenerative power of the cells composing an organism are inversely proportional to the age of the organism.* Aside from this most striking deficiency in function, we might ascribe many of the tissue degenerations to another condition practically always associated with age, viz., to a diminished blood supply dependent on arteriosclerosis. We see these degenerations frequently, however, in tissues possesed of an abundant blood supply, and in which arteriosclerosis is absent. On the other hand, involution degenerations do not occur in the tissues of the young, even when a local arteriosclerosis is present or when the vascularity of the part is diminished by reason of other conditions.

Arteriosclerosis does not in itself constitute age, although it is probably the best measure which we possess of senility in the general cellular system. We probably have in the vessels, preceding and causing their eventual sclerosis, both diminished resistance to

bacteria and toxins and loss of regenerative powers of the endothelium, all acting to produce the substitution of the endothelial cells by fibrous tissue. The production of fibrous tissue is itself, no doubt, directly associated with the loss of the power of regeneration on the part of the ectodermic or endodermic cells which it usually replaces.

We are then compelled to fall back on one of the two remaining hypotheses—either the senile condition of the cell (of which loss of the regenerative function is the prominent sign) is due to failure of the metabolic activities connected with nutrition, or it is due to lack of power to neutralize and to oppose the action of pathogenic organisms, or of toxic substances.

On closer analysis, we perceive both these former deficiencies to be present and inherent in the senile cell, in common with the loss in the power of regeneration, though the latter deficiency is most evident.

Whether we regard the depreciation of the cell as metabolic or bacteriolytic the failure must be primarily nutritive, as Metchnikoff has clearly shown that the antitoxic properties of a cell are closely connected with its nutrition and growth and are probably only specific modifications of the function of nutrition to adapt the cell to the special necessities of the organism. There must be some common source from which the cell derives its metabolic, bacteriolytic and antitoxic functions. As these functions diminish with advancing years, it is natural to suppose that the source from which they are derived diminishes in like manner; our first step in the investigation of this source, therefore, would be the comparative investigation of the senile and juvenile cells. The comparative analysis of the young and old cell does not as yet show any perceptible difference in their chemical composition, nor can we detect with the microscope any structural divergence; it is in their biologic functions and properties alone that we detect their dissimilarity. That the deficiency of the senile cell is a chemical one we have reason to believe by analogy with other functionating cells. When we speak of a cell being worn out or exhausted we infer that some substance which the cell previously contained has become deficient during the performance of its functions.

We judge from the constant chemical composition of specific cells of all ages that such substance, if existant, must be present in minute quantity.

It is on the theory of the existence of this substance that I have formulated my hypothesis:

1. *That every living cell, human or animal, contains a specific substance necessary to its functions.*

2. *That this substance becomes progressively exhausted during the life of the organism, to a certain stage, beyond which the metabolic activities of the cell are brought to a close.*

3. *That this substance alone, of all the materials entering into the composition of the cell, is not renewed after a certain early stage of the life of the organism.*

4. *That the age and duration of the activities of the cell are dependent on the amount of this substance with which it is primarily endowed.*

5. *That the primary endowment of the cell occurs at a very early period of its growth.*

This substance I have called bioplasmine.

We may illustrate the relation of a bioplasmine to the organism as follows: The individual may be compared to a lifeboat cast adrift from a sinking ocean liner (the parent organism), the members of the crew representing the individual cells, and a cask of water the supply of bioplasmine from the ship's stores. This supply may be exhausted quickly or slowly, according to the demands made on it, but it will never be renewed. The water, it will be further noted, is not equally apportioned among the members of the crew.

As all the materials of the cell, except this specific cell substance, are constantly renewed, the bioplasmine molecule occupies a place apart in the cell substance.

That this molecule is independent of the composition and activities of the cell substance proper we can infer from the apparently identical composition of the juvenile and senile cells. The specific chemical composition of the cell remains the same, according to our present means of chemical analysis, whatever its age, and it is mainly by the loss of power of reproduction and regeneration and the bacteriolytic functions that we can perceive its gradual decline and final dissolution.

As regards the nature of bioplasmine, it can only be said that it remains very much the same substance during life, except that its activities become progressively lessened. This would lead us to believe that we have to deal with a comparatively large proteid molecule which has the power of splitting off some body essential for the metabolic changes concerned with nutrition. This substance may be called metaboline or nutrescine. The bioplasmine molecule may be represented by the following graphic formula (Fig. 1):*

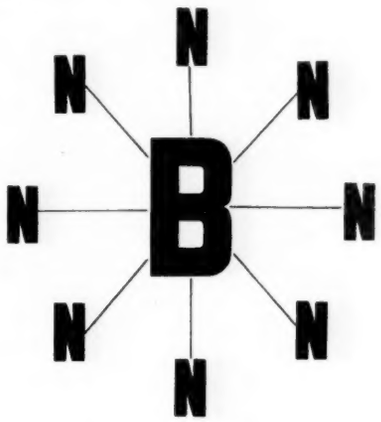


Fig. 1.—Bioplasmine.

It is not likely that this substance is formed by a single process of combination, but rather that it is the result of a series of anabolic changes.

For its origin I believe that we must look to the very earliest of the processes leading to the formation of the embryo, preceding the time when the activities of formation and growth become macroscopically manifest.

Judging by analogy, we would suppose that the substance called bioplasmine, like other substances concerned with metabolism (such as the enzymes), had a preliminary body or zymogen from which it is generated. This substance may be called *bioplasminogen*. The transformation of bioplasminogen into bioplasmine taking place in the cells during the act of absorption. We have first to consider, then, the formation of bioplasminogen.

Some of the reasons have already been briefly mentioned for placing the time of the formation of bioplasminogen in the early history of the embryo, and there are further reasons for supposing that this formation takes place at the beginning of the life of the organism as a separate entity, viz., during the act of conception. The strong physical attraction between the male and

* In all the figures B represents the central radicle proteid or binding group; and N the "side chain" group spoken of as metaboline or putrescine.

female sexual elements would indicate a basis in a strong chemical affinity, and it is during this act that a substance enters the composition of the cell that can not be renewed during its later life.

The action of the male on the female cell would appear primarily to be one of ionization, and it is possible that we may find in the nutrescine molecule a substance peculiarly capable of ionic dissociation. The nutrescine molecule need not necessarily be of proteid composition, but may consist of various mineral elements or salts combined in such a manner as to produce the degree of ionization necessary in proteid anabolism.

Loeb believes that the primary action of the male on the female cell, leading to the formation of the morula mass, to be one of ionization. As is well known, he has been able to produce the early stages of the processes following impregnation, leading even as far as the formation of imperfect embryos, by the action of dilute solutions of various salts, particularly potassium cyanid, on the unimpregnated ovum. It is interesting to note that by the action of this salt an extreme prolongation of life in certain low animal forms has been possible. It is possible that cyanogen or a similar radicle may enter into the composition of the nutrescine molecule of the bioplasmine body.

We may conceive of three, out of many intermediary stages, in the formation of bioplasmine. The specific elements leading to its production are doubtless to be

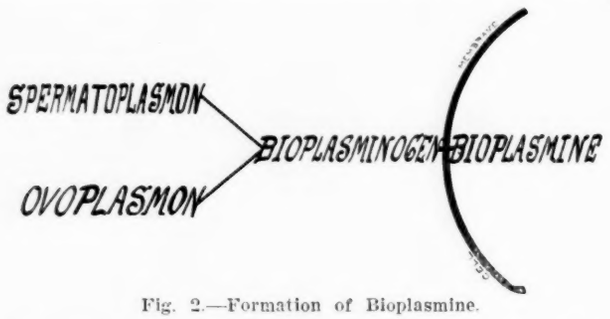
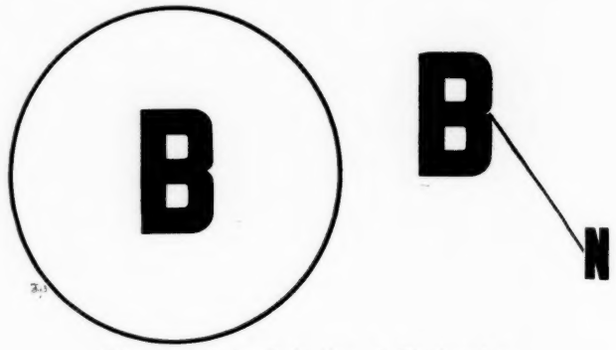


Fig. 2.—Formation of Bioplasmine.

found in the elementary male and female cells. These cells we may consider to contain substances possessed of strong mutual affinities which may be named spermatoplasmon and ovoplasmon, respectively (Fig. 2). By their interaction, ovoplasmon and spermatoplasmon give rise to bioplasminogen; this body is then taken up by the cells, probably during their active segmentation, and by them further transformed during absorption into bioplasmine. There would be no reason to suppose that the cells retain this power of transforming the bioplasminogen molecule and of absorbing it indefinitely, and it is probable that this function is at an end after the embryonic cells have ceased their active segmentation, i. e., after the formation of the morula mass.

The bioplasmine molecule is apparently quite stable, though it is capable of disassociation with great readiness under the proper stimulus.

Starting with the graphic formula (Fig. 1), bioplasmine undergoes progressive decomposition by the loss of successive nutrescine molecules, the completed reduction only occurring theoretically with the loss of all the N/ molecules (Fig. 3). More probably, however, a complete reduction would not be possible through the forces of vital chemistry; the end-product would be better represented theoretically by the graphic formula in Fig. 4. The power of parting with the N/ molecule which the bioplasmine body possesses when subjected to the action of certain stimuli depends on a sort of instability which makes it readily capable of decomposition under physiological influences. It becomes progressively more stable as the number of N/ molecules diminish until it reaches a stage where the physiologic stimuli are no longer capable of causing dissociation, so that practically the metabolic activities of a cell never survive to a stage where the whole molecule would correspond to the graphic formula shown in Fig. 3 or 4, but would cease when the number of N molecules was still relatively large.



Figs. 3 and 4.—Reduction of Bioplasmine.

We may use these formulæ as a graphic means of representing the physiologic age of the cell according to the state of the bioplasmine molecule which it contains. Dividing the age of the cell into three periods, we can represent the youthful, middle-aged, and senile cells as is shown in Fig. 5.

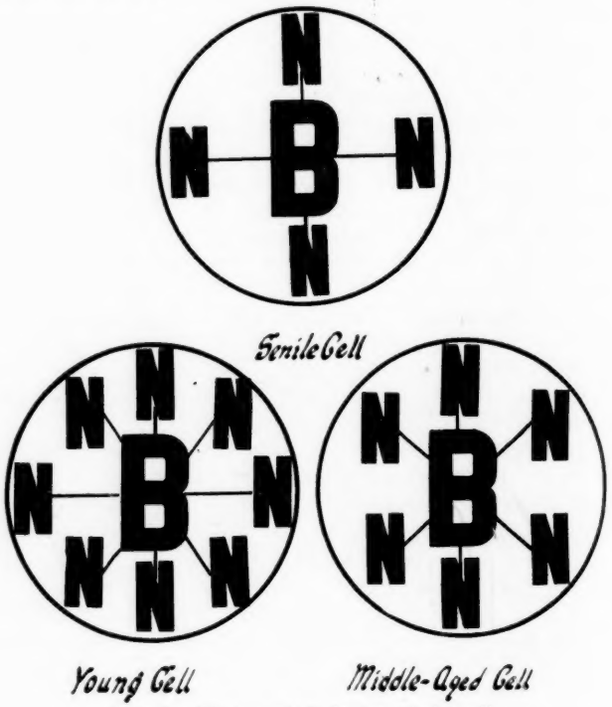


Fig. 5.—Three periods in age of the cell.

The molecule N probably represents the essential body both in metabolic processes and in the formation of antitoxins and bacteriolysins, so as the cell becomes older not only do its metabolic functions become diminished, but it is increasingly less able to cope with pathogenic organisms and toxins.

When the bioplasmine molecule reaches a certain degree of stability, the cell becomes eliminated either by the action of parasites or by the substitution of cells

endowed more liberally with the essential metabolic molecule.

The supply of bioplasmine does not seem to be equally distributed among the various cells, the connective tissue cells seem to be most liberally endowed and the more highly differentiated cells appear to become deficient long before there is any marked diminution in the capabilities of the cells of the mesoderm. If we take the regenerative powers of the cell as a measure of the amount of bioplasmine with which it was originally endowed, we find a marked difference in the stage at which senility becomes evident in cells possessed of different functions. The nerve cells have been considered to have no power of reproduction after the time when they have taken on their special function, but it has recently been shown that even nervous cells have a power of regeneration during the earlier periods of the life of the animal.

The chemical properties of bioplasmine must be considered more or less unique. It seems under ordinary conditions to possess a certain stability, yet when the proper stimulus is applied it appears to part with one or more of its nutrescine molecules with great facility. Its action is different from most of those substances which cause chemical or physiologic combination by their presence in minute quantity, inasmuch as the N/ molecules do not undergo decomposition and recomposition as do bodies having the so-called catalytic action (such as the ferments), but they enter into direct combination with the nutritive bodies formed and are thus permanently lost with the cellular katabolisis. Bioplasmine is the one substance of the materials composing the cell which is not renewed during nutritive processes. It thus has a place apart from the cellular chemical changes which it influences indirectly by parting with its nutrescine molecules.

In order to arrive at some suggestive conclusion as to the nature and mode of action of this body whose existence I have assumed, I have further taken up the study of regeneration and reproduction on the basis of this theory, as these functions best mark, as already stated, the difference between the young and old cell. From this theory I have endeavored to formulate rules under which reproduction not only may occur, but to determine the conditions under which it necessarily must occur if these conditions are present in the cell and its surrounding medium. These rules may be presented in the following form:

In the young cell a certain stimulus arises from the surrounding medium for the production of N bodies, which production occurs in excess, a certain number combining to form preliminary substances which are to undergo further anabolic changes, finally to convert them into the proximate principles of the cell, the remainder being left free and uncombined within the cell. As the stimulus arises from the surrounding medium, the production of N/ bodies is most marked at the poles of the cell (which are most exposed to the medium). This overproduction soon reaches such a stage that the plasma elements can not enter the cell in sufficient amount to combine with the N bodies without an increase in the area presented by the cell to the surrounding medium. This increase is then accomplished by division of the cell, which is a necessity in order to adapt it to the changed conditions. Mitosis is favored by molecular tension resulting from the accumulation of N bodies at the poles of the cell, where the influence of the surrounding medium is most marked. This process is the basis of the chemical and vital forces of mitosis, with the physical evidences of which we already are familiar. The basis of mitosis thus is purely chemical and is determined by a stimulus derived from the plasma.

The action may not be wholly one of principles in solution in the plasma; certain cells, particularly the leucocytes, seem to have the power of exciting cell proliferation. The chemical basis of mitosis is represented graphically in Fig. 6.

The influences leading to cell regeneration are not wholly to be found in the plasma, but also depend on the number of cells among which the stimulus must be divided. The cell deficiency which occurs from traumatism is no doubt a potent influence in determining regeneration, but equal importance is to be ascribed to the effusion of lymph and to the presence of leucocytes which always collect in numbers where there is any considerable destruction of fixed cells.

It is possible that different chemical compounds act as stimuli in reproduction, on the one hand, and in regeneration, on the other. We can not consider, for example, the formation of scar tissue as the result simply of reproduction of the connective tissue cells; a special stimulus seems to be necessary to cause the connective tissue cells to form a scar. This stimulus may be derived from the mononuclear leucocytes also, as scar

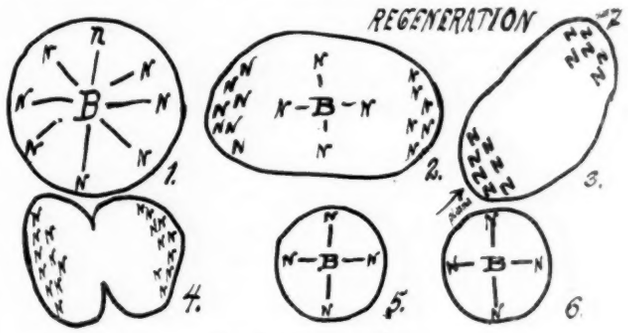


Fig. 6.—Regeneration.

tissue forms in the infectious granulomata, in which the polymorphonuclear leucocytes are largely absent. There are doubtless many intermediary bodies capable of combining with the bioplasmine radicle, of which the leucocytic stimulant may be one.

The question of abnormal regeneration may be briefly touched on. Morbid proliferations play an important, if not essential, part in benign and malignant neoplasms. The bioplasmine molecule must be concerned in these processes, though not necessarily directly. The influence of the bioplasmine molecule may occur in one of two ways—either the bioplasmine molecule becomes disorganized and parts with a number of nutrescine molecules far in excess of the physiologic needs of the organism, or the same result is produced under the action of a pathologic stimulus derived from the plasma. In producing the fatal result we have both the directly injurious action of the morbid growth or growths and the exhaustion of the essential nutritive principle. It is the latter factor which is most active in producing the general organic nutritive deficiency spoken of as cachexia.

Regeneration and growth, both normal and pathologic, take their character from heredity, using the term in its largest significance, and the subject of heredity is itself capable of further analysis along these lines. The principle on which heredity depends can not be limited to the individual, family or race, but must be extended

to species as well. That the properties of a cell should persist through several generations points to the conclusion that the persistence depends on persistent chemical and physical composition of the cell. Or using the term in the sense of qualities persisting in the descendant cells, heredity may be defined as the persistence of the chemical composition of a cell through several generations of descendants.

The problem becomes more complex when we deal with the higher organisms, because among these are specifically differentiated cells, possessed of varying properties and capabilities. While these properties and capabilities are derived from the ancestor, the problem is much complicated by the necessary inter-relations of the component cells forming the organism. Further, the individual functions and capabilities of the cell are more numerous. The character of the individual depends on his nutrition, the term nutrition signifying in general the chemical and physical composition of the cell in relation to its medium. In the persistence of the chemical cellular endowment in the ancestors we have the cause of the similarity of individuals forming the family, race or species.

Very generally stated, the characteristics of an individual depend on two factors: 1. The individual nutritive capabilities of the component cells. 2. The harmonious action of the various classes of cells. Since the nutrition of a cell is dependent on the bioplasmine molecule, this body must play an essential, if not the only, part in determining heredity.

Concerning the influence of bioplasmine in heredity, we have to consider in the individual the following factors:

As regards the individual cells: 1. The amount of bioplasmine with which the original cells are endowed. 2. The character of the bioplasmine molecule, particularly its facility of dissociation under appropriate stimuli; as regards the organism as a whole, the harmony or lack of harmony of nutritive energy between the variously differentiated cells.

The latter factor determines whether the resultant will be large or small.

Generally, we will look for a maximum resultant in certain functions and a minimum in others. We look for a certain similarity in the successive similar functions in the individual, and these similarities we can group under the head of characteristics.

It may be permissible to speculate on the practical results that might accrue from the isolation of a specific metabolic body from the cell. If, for instance, we could isolate and determine the properties of bioplasmine, we might consider that we had made a step toward the almost indefinite prolongation of life. The problem which would present itself would be the renewal of the tissue supply of bioplasmine whenever the original supply gave evidences of becoming exhausted. There are many difficulties in the way of renewing this material in the body, even if we had successfully isolated and manufactured it. It is probable that bioplasmine, as such, is not absorbed by the proliferating cell, but must be absorbed as the preliminary body which has been spoken of as bioplasminogen; moreover, it would not be reasonable to expect a matured cell to take up bioplasminogen if it could be injected into the blood of the organism, as it is probable, as already suggested, that the cell only possesses the function of absorbing bioplasminogen during a very early period of its embryonic life. The function may cease as early as the formation of the morula mass. It may be possible that we could extract from the embryonic cell some substance that would enable the matured cell to absorb bioplasminogen and to convert it to its uses.

I would consider, however, that the first advance to be made in prolonging life would be by the use of substances capable of stimulating the bioplasmine to yield a further quantity of its nutrescine molecules when this could no longer be accomplished by the physiologic stimulus. It is not likely that the bioplasmine molecule is ever so far reduced during life that there does not remain a considerable number of N/ molecules in combination.

It is to the physiologic chemist that we must turn for the elucidation of these and of most other obscure problems of the medicine of the future, and we can expect them to respond with the same enthusiasm with which they have already surmounted so many obstacles. A careful differential analysis of the juvenile and senile organs will well repay the time spent, though it may be yet too early to hope for the isolation of a body so unstable and present in such small amounts as the one we have described.

It is not too much to expect of the scientists of the future that they may enable our descendants of 1,000 or 5,000 years hence to realize or to surpass the years of Noah, which are said to have been over 900, or even of Methuselah, of whom Moses says in Genesis, "And all the days of Methuselah were nine hundred and sixty and nine years, and he died."

DISCUSSION.

DR. DENSLOW LEWIS, Chicago, referred to the time when he was a medical student at the University of Michigan, some twenty-eight years ago, and congratulated the profession and the public on the advances that have been made in medical teaching since that time. The production of such a paper was impossible then; our knowledge had not advanced sufficiently to enable us to make these researches. Dr. Lewis said that all should feel very thankful that physiologic chemistry has taken such strides of late. We can look forward confidently to the future, in the hope that these technical studies will result in vast practical benefit.

DESCRIPTION OF AN ADVANCEMENT SUTURE.

WITH COLLECTIVE SUGGESTIONS REGARDING OPERATIONS ON THE OCULAR MUSCLES.*

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I am a firm believer in conservative surgery and advocate careful operative interference only in suitable cases after all other means, e. g., the use of proper lenses, prism exercises, or fusion training, have failed to accomplish the desired results, to wit: cosmetic straightening of the eyes, parallelism of the optic axes, fixation, establishment of binocular single vision, and in phorias, obtaining the normal balance. I do not intend to discuss the many excellent non-operative methods of treating or aiding these cases, but in this paper I presuppose that all of these have failed, and turn in proper cases to operative procedures as a last resort.

I think that an advancement, alone or combined with a tenotomy, is practically always to be preferred to a tenotomy alone. An external ocular muscle is seldom too strong, the rotation of an eye rarely exceeds the

* Read in the Section on Ophthalmology of the American Medical Association, at the Fifty-sixth Annual Session, July, 1905.

normal, but in squint and heterophoria, defective rotation in one or more directions is usually found in one or both eyes. Weak and *not* too strong muscles are usually to be dealt with and an operation that will strengthen a weak muscle so that it can properly functionate is required. If in one of these cases, a certain muscle exceeds the normal in strength and its opponent is normal, a tenotomy alone on the over strong muscle is, of course, good practice, providing the degree of squint or tendency to such, is not of too high a degree. All operations should be modified or elaborated, depending on the results of the tests of the relative powers of the muscles.

If the defect to be overcome is slight, as in low degrees of squint or heterophoria, an advancement alone may be all that is necessary, but very frequently I think it advisable to tenotomize, partially or completely, the opposing muscle of the same eye. The degree of this tenotomy must vary according to the needs; when only low degrees of squint or tendencies to such are to be overcome, a slight partial tenotomy which I have recommended, only in these cases, may be done, just sufficient to weaken temporarily the strong opposing muscle. This may be accomplished with but slight or no change in the ultimate attachment of the tendon so that the rotating function of the tenotomized muscle will not be interfered with, or at most, but very slightly. If the tendon is not completely severed, Tenon's capsule not opened too freely, and the check ligaments not tampered with, the muscle cannot change its point of attachment much. It will be in a temporarily weakened condition, however, and will not strongly oppose the advanced muscle, which will in the meantime soon become attached. Thus both muscles will heal at the same time and the function of each will be temporarily and partially suspended due to traumatism.

If tenotomy is not performed at the same time as the advancement, there is a high degree of tension of the ocular muscles which tends to loosen the sutures and fresh tendinous attachments and to force the eyeball back into the orbit. The results immediately after the operation may be correct and satisfactory, but before healing takes place, some slipping of the suture is apt to occur, due to the constant tension of the strong opposing muscle, and the final result is sometimes more or less unsatisfactory. When the opposing muscle has been but slightly tenotomized, no such strain is brought to bear on the suture, and the result, after the operation, is much more likely to be a permanent one. If it is necessary to overcorrect in advancement operations, as many authorities state, it simply demonstrates that the suture used or the attachment of the tendon slips; that the operation is not scientific, especially since it would not be possible to know the amount of probable slipping, and hence of overcorrection necessary. If the suture that will shortly be described is properly made, it will not be necessary to overcorrect and the first effect will be final. Under cocain anesthesia the immediate effect should be permanent and correct. Of course good results largely depend on the good judgment of the operator, as these operations cannot be reduced to mathematical accuracy.

Among other tests I always examine the field of rotation of each eye by Stevens' tropometer in order to determine the relative strength of the muscles. I sometimes find that the total or chief weakness in the muscles of the fixing eye, and if, in such cases, the vision of the squinting eye is good and especially if there is hope of binocular vision, I operate on the muscles of the fixing eye.

The suture material should be black braided silk, about No. 8 in size, which has been boiled, dried and then soaked in a warm sterile ointment composed of equal parts of white vaselin and white wax and 0.25 per cent. carbolic acid. After removal from this ointment the suture is stiff and slips readily. The needles should be sharpened and examined with the same care as cataract knives and always kept in a dry place. Except when in use they should be handled only by forceps, never with the fingers, which might cause them to corrode. It is well before the operation to examine the needles under a strong magnifying lens such as a powerful loupe or a +20 D.S. lens, for often the ends will be found bent or forked, which would prevent the needle from passing readily.

My advancement operation is a modified Worth's, the method of suturing, the most important part, being the only essential difference. It is usually done under local anesthesia, except in very small children and exceptionally nervous people. I have performed this operation on children 7 and 8 years old under local anesthesia. If it is to be done on one of the lateral muscles, for example, a long ½ inch curved incision is made vertically through the conjunctiva, the center nearly touching the cornea, the ends curving away from it. Tenon's capsule is next opened, but not so freely as the conjunctiva, the conjunctiva and capsule are pushed well back, the muscle, capsule and conjunctiva are clamped together by advancement forceps, the toothed blade being superficial to the conjunctiva, then the tendon is cut free from the sclera. However, it is easier sometimes to cut the tendon on a strabismus hook, as afterward it can always be seized and held by fixation forceps while the advancement forceps are being adjusted. It is frequently advisable to change the relative position of the conjunctiva, capsule and tendon in the grip of the advancement forceps, pushing the conjunctiva and capsule farther back on the tendon or vice versa. In paralytic and some other cases, it is best to clamp the conjunctiva, capsule and muscle together without changing their relative positions. I have never found any difficulty in recovering possession of the tendon in case it slipped from the advancement forceps. One of two sharp needles on a prepared suture, is next passed from without inward through the conjunctiva, capsule and junction of the upper and middle thirds of the tendon or muscle. The same needle is then passed outward through the upper margin of the tendon or muscle, through the capsule and conjunctiva, then back through all three just behind the first point of entrance, forming a complete loop. It is then carried subconjunctivally almost to the edge of the cornea and stitched deeply through the episcleral tissue into the sclera. The needle on the other end of the suture is similarly used, making a loop on the lower portion of the tendon, capsule and conjunctiva and also making an episcleral and scleral anchorage near the cornea and close to the other suture, then the two sutures are tied in the first part of a surgeon's knot. Sometimes it is sufficient to pass only one needle through the episcleral and scleral tissue, tying the sutures as before. All superfluous tissue should be removed—only sufficient being left to hold the sutures and close the gap when the sutures are tied. If thought advisable, next perform the proper degree of tenotomy on the opposing muscle of the same eye. The

patient is then requested to look steadily at some small distant object and the hand is passed alternately before each eye while the suture is tightened until the eyes cease to move, when the desired rotative effect is secured and the knot is completed. Under general anesthesia only an approximate correction can be expected. In such cases it is often preferable to tie the suture under local anesthesia after the patient has recovered consciousness and the cover test can be used. It is never necessary to suture the conjunctiva on the side of the advancement, but it is sometimes best to do so over the tenotomized muscle.

By this suture, the upper and lower portions of the tendon or muscle are securely held in separate loops, but not strangled, while the circulation in the middle portion is not interrupted although it is also supported by the cross piece of the suture. The more tension put on this suture, the more securely it will grasp the tendon or muscle. Only one knot is necessary, whereas four are required in Worth's operation. Furthermore, the suture can adjust itself as in the pulley operation and cartwheel motion can be influenced by the location of the anchorage into the sclera. It is simple, easier and takes less time to make than most other sutures, and it holds.

I believe that it will hold, not only in the tendon but also in the muscular tissue, especially when fortified by passing it through the conjunctiva and capsule as described. Different authorities estimate the tendon of the external rectus to be about 3.7 mm. long. I have repeatedly placed the suture farther from the insertion of the tendon than its estimated length, hence in the muscular tissue, with perfect results. If Tenon's capsule is pushed well back on the muscle or tendon, it can afford considerable support to the suture and, because of its great elasticity, it will not limit, ultimately, the rotation of the eye to the opposite side. Furthermore, a careful study of the Y shape of the muscle, tendon and check ligament will make clear why an advancement will increase rotation, and not diminish it as a tenotomy does, and also why advancement of the capsule forward will not tend to limit the rotation of the eye to the opposite side. I have frequently tested the field of rotation in eyes thus operated on and found it to be as large or even larger than before the operation was performed. The only possible objection to this suture that I can think of, is that in case any portion of its mooring should slip, it would affect the whole suture. However, this accident has never occurred in my practice.

I soon learned that the greater part of the pain in an advancement is caused by the manipulation of the forceps during the insertion of the sutures. Advancement forceps have usually had their blades at an obtuse angle to the handle and this makes it difficult for the operator to tell how the end of the instrument is placed. He is inclined to move the handle in the middle line, thus strongly pulling one side of the muscle or tendon. The long heavy handle on most forceps, when not supported, also acts as a lever, the eyeball or lids serving as a fulcrum, and pulls themuscle, causing pain. My forceps are curved on the flat so that the end of the handle is always supported by the nose or temple, while the middle portion does not rest on the eyeball or lids. The blades are at right angles to the handle, therefore the forceps are easy to manipulate, causing much less pain than the others with which I am familiar.

Cold applications should be made at regular intervals the first day. A monocular bandage with gauze pad is required for about seven days, the eye being irrigated with some mild antiseptic and dressed each day. In the eye not operated on a drop of 1 per cent. atropin sulphate solution should be instilled and it should be covered with a shade for 24 or 48 hours which may be raised when necessary. The sutures are removed at the end of one week. The patient should be cautioned to look straight forward, turning the body and head instead of the eyes for the first few days. If lenses are to be worn, pieces of adhesive plaster may be placed on them so that a narrow vertical clear space may be left through which the patient can see except when the eyes move laterally. He had best remain in a semi-dark room for the first two days and not use the eyes for at least one week.

After the above consideration of this important subject, I decided to address a circular letter to ophthalmic surgeons throughout the United States in order to have their views regarding some of the difficult questions in ocular muscle operations. I wished to learn regarding only those cases where non-operative treatment had failed or was impracticable, fully realizing its importance in the majority of cases.

That this branch of ophthalmic science is not thoroughly understood is clearly demonstrated by the wide diversity of opinions among leading ophthalmologists, and while in some phases of this interesting subject no uniformity of opinions can be found, yet regarding others, it is possible to arrive at certain deductions. Unfortunately I neglected to place the name of the opthalmologists addressed on the question sheet, therefore I am unable to state the authority for many excellent answers, owing to the failure of the writers to sign their answers.

In what percentage of your ocular muscle operations do you prefer an advancement alone and in which cases?

In over eighty replies to this question but twenty seven stated percentages, the average of which was about 15 per cent. As to the cases in which advancement alone is preferred, many replies were received. Several excellent observers advocate its use in low degrees of exotropia and in exophoric cases, the general censensus of opinion being that it is of the greatest benefit in only a low degree of squint or in a tendency to the same. Some state that it is efficient when a simple tenotomy will not correct or has failed to do so or in case of previous overcorrection. Gifford of Omaha states that it should be used in divergent squint where binocular vision may be expected. Todd of Minneapolis advises its use in a large percentage of phorias and in some alternating tropias. Savage says he uses it only rarely and in cases where the stronger muscle is not intrinsically too strong. Among those who seldom, or never do an advancement alone, are Knapp, Thorington, Hubbell, Ellet, Bradfield, Lapsley, King, Roy, Melville Black, Lukens, Minor, Theobald, Snyder, Foster and Woods.

Do you think that a suture will hold in the muscular tissue or only when placed in, through, or against the tendon?

Reber, Posey, Ziegler, Greenwood, Melville Black, Carrow, Hills, and a few others state that a well placed suture should hold in the muscular tissue. Other observers think that it would conditionally. Among those who have the opinion that the suture would not hold in the muscular tissue, but only in the tendon, are Woods, Weeks, Rogers, Veasey, Wescott, Thorington, King, Vail and Holt. Many include either the capsule or conjunctiva or both, as Holmes, Risley, Knapp, Sav-

age, Würdemann, Dodd and Gifford. Culver and Eaton believe it is best against the tendon. Todd and Howe state that there must be a loop, knot or ligation of the muscle or tendon in order that a suture may hold. I think there may be some slipping of the sutures where the capsule and conjunctiva are not included. It is well to remember that the tendon of the external rectus e. g. is but 3.7 mm. long, and since the sutures are often placed farther from the insertion of the tendon than its whole length, they must be in the muscular tissue.

Do you pass your suture through Tenon's capsule to get additional hold and, if the capsule has first been well pushed back on the tendon, do you think it subsequently affects the rotation of the eye to the opposite side?

Eighty-five per cent. of the replies state that the capsule of Tenon and conjunctiva are included with the muscle or tendon in the suture. Tenon's capsule and the conjunctiva are not included in the suture by 6 per cent. of those who answered. Eighty per cent. of these replies indicate that if the capsule is pushed well back on the tendon before introducing the suture, the rotation in the opposite direction will not be affected. Fifteen per cent. express a belief that the rotation will be affected. About 10 per cent. of the observers seem to think that the capsule should not be pushed back on the tendon.

Do you anchor the suture deeply in the sclera? Have any serious complications been caused by so doing? To what do you attribute it if the suture in the sclera gives way?

Sixty per cent. of the ophthalmic surgeons who replied pass the suture deeply in the sclera. About 15 per cent. pass the suture only superficially through the sclera, or even in only the episcleral tissue. Among the former are Reber, Nance, Connor, Culver, Savage, Holmes, Knapp, Greenwood, Donovan, Weeks, Melville Black, Stricker, Ellet, Gifford, Wescott, Vail, Dean and Würdemann. For every man who believes that deep sutures in the sclera cause serious complications, fifteen think they do not. Several did not answer this part of the question. The great majority of observers think that if the suture in the sclera gives way it is because of its not being placed deeply enough in the sclera or in not including enough of it. Suppuration, too small or too large a thread or needle, too much cutting by the needle, careless tying of the suture, too high tension and insufficient strength of the tissues are also mentioned as explanations.

In advancement do you believe in overcorrecting at the time of the operation? a. If a tenotomy has been performed on the opposing muscle of the same eye? b. If such tenotomy has not been performed? What tests, if any, do you make at the time of the operation to learn when the desired amount of effect is obtained?

About 50 per cent. of the observers believe in overcorrecting at the time of the operation: about 30 per cent. do not; the remaining 20 per cent. are conditional. Some would overcorrect in divergence, but not in convergence, particularly if the convergence be in children. About 60 per cent. consider overcorrecting unnecessary if a tenontomy of the opposing muscle has been performed; about 20 per cent. believe in overcorrection in case the opposing muscle has been tenotomized. Among those who believe that overcorrection is necessary if tenotomy has not been performed, and who usually think it is unnecessary to overcorrect if tenotomy has been performed, are Würdemann, Greenwood, Donovan, Weeks, Eaton, Callan, Griffin, Seabrook, Roy and Ayres.

In approximately what percentage of cases of advancement do you tenotomize the opposing muscle of the same eye, making a combined operation? Name your chief reasons for so doing.

Although some strongly advise against tenotomizing the opposing muscle of the same eye together with advancement, a much larger proportion prefer the combined operation, the average percentage being about 76. It is especially advised in cases where the eye is amblyopic and where there is squint of 15 degrees or more. It is said to increase the effect and to relieve the tension on the suture, so that it will not cut through so readily, and the final result will be more nearly like that at the time of the operation. Savage says the stronger muscle needs weakening and the weaker needs strengthening, especially in internal and external squint, and that he never cuts a tendon entirely across. Some of those who advise the combined operations under different conditions are Risley, Connor, Posey, Savage, Baker of Cleveland, Culver, Todd, Ziegler, Würdemann, Woods, Greenwood, Holmes, Weeks, Theobald, Eaton, Melville Black, Stuever, Veasey, Callan, Bradfield, Griffin, Seabrook, Hulen, White, Ellet, Wescott, Crane, Martin, Hubbell, Holt, King, Roy, Lukens, Hale, Starkey and Thorington.

In what percentage do you perform tenotomy alone and in which cases?

The average of the answers gives approximately 38 per cent. A very large number advise tenotomy in cases of heterophoria, especially hyperphoria and esophoria, and in low degrees of heterotropia. Some never perform tenotomy, others do it in all cases. Several stated that if the deviation does not exceed 15 degrees, they do tenotomy alone. Several limit it to the above-mentioned cases, where the vision is good with the two eyes; some to cases where there is no hope of binocular vision, and a few where the squinting eye is amblyopic. Weeks prefers tenotomy in squint of low degree where the opposing muscle is of normal power. Ellet uses it in some cases in children where it seems nature, if helped, will cure. Savage recommends it in a very large percentage of heterophorias. De Schweinitz writes that he is more and more convinced that tenotomies are likely to be followed by excessive effects in after years, and that he inclines more to advancements in the place of tenotomies. Stevens and Risley call attention to the fact that the vertically acting muscles are sometimes at fault, when the defect is apparently in the lateral muscles.

What means, if any, do you employ to prevent sinking of the caruncle?

A majority of the answers showed that nothing was done to prevent sinking of the caruncle; several advise free dissection of the conjunctiva from the underlying tissues out under the caruncle and particularly recommend the avoidance of too free incision of the capsule, and also warn against any or too much interference with the check ligaments. Some recommend that the opening in Tenon's capsule and the conjunctiva be very small; others that the opening in the conjunctiva be large, but that it is subsequently sutured. Holt considers it important that the dissection be carried up under the caruncle in order to cut any fibers of muscle going to it.

Do you think a partial tenotomy has any appreciable permanent effect?

Seventy-five per cent. of the answers to this question are negative. Some have not tried the operation, many others believe the effect is but slight. Among those who answer in the affirmative are Savage, Connor, Zieg-

ler, Weeks, Howe, Griffin, Minor, White and Holt. Several, especially Würdemann, Holmes, Risley, Baker of Michigan, Bradfield, Foster, Eaton, Martin, Porter of Chicago, Carrow, Crane and Grove are very emphatic in opposing it, particularly in so-called true graduated tenotomy.

If any effect is obtained by a partial tenotomy, is it to be ascribed to interference with the check ligaments, stretching or to what?

Connor and Weeks attribute it to weakening of the muscle, Greenwood to a lessened action of the muscle fibers that have been cut, Ziegler to the elongation of the tendinous attachment, Holt to the setting back of the central fibers of the tendon, Ayres to stretching. With a very little experience, I do not believe that a slight graduated tenotomy, where only the central portion of the tendon is cut, has any permanent effect, as I have repeatedly found that even the slightest strands in the peripheral portion of the tendon, or even posterior to the insertion of the tendon, often prevent the eyeball from changing its position in regard to the muscle, before the reattachment of the tendon. Cicatrization plays an important part in the final effect, no doubt making the condition worse, although at first it may have been better. I think that if an effect is obtained it

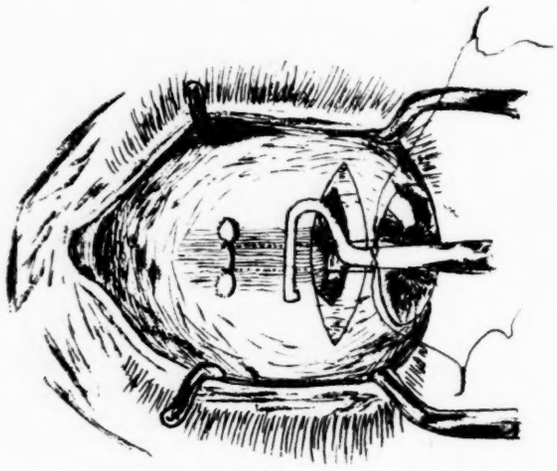

Fig. 1.—Opening in conjunctiva and capsule and position of advancement forceps, suture and knot.

is probably due to stretching of the muscle or tendon, as may be done by a strabismus hook, the complete severance of the tendon, or interference with the check ligaments. Of course, the latter two should not be described as a partial tenotomy.

Do you always operate on the squinting eye or are you guided by the degree of rotation of each eye, e. g., as measured by Stevens' tropometer?

A large majority operate only on the squinting eye. Todd, Ziegler, Weeks, Eaton and Hills depend largely on the degree of rotation of each eye. Several always operate on the squinting eye first, especially if it is amblyopic, and later on the other, if necessary.

In approximately what percentage of all your cases do you operate on the fixing eye only? a. If on both eyes separately, why? b. If on both eyes at the same time, why?

The replies show that only a small number operate on the fixing eye alone. Many operate on each eye separately to obtain the desired result, and are guided in the second operation by a knowledge gained of the patient by the first. But very few ever operate on both eyes at the same time, and then only in case the squint is of high degree, or where one eye is very amblyopic, as they fear overcorrection or accident. If the vision in the squinting eye is good and defective rotation is chiefly or wholly found in the fixing eye, and particularly, if binocular single vision is hoped for, I think that the operation should preferably be performed on the fixing eye.

Do you operate when the muscles are paretic or paralytic? What are your indications, choice of operation and results?

Nearly all answer the first part of this question in the affirmative, usually advising advancement combined with tenotomy of opposing muscle of the same eye. Some advised advancement alone. The majority claim good results, especially from a cosmetic standpoint, and several stated that the patient was relieved from the annoyance of turning the head to such a large degree. Many, among whom are Reber, Gifford, Griffin, Ball of Pennsylvania, and Hubbell, advise operative procedures where other means have failed to relieve in one or two years. Stricker of Cincinnati claims excellent results from the use of prisms. He also suggests that as other muscles may subsequently be involved, the cosmetic effect following operation may come to naught. As before stated, I think it advisable, in these cases, to pass the sutures through the muscle or tendon and also through the capsule of Tenon and conjunctiva, without changing their relation to each other.

If the wearing of proper lenses or exercises have corrected the squint and made an apparent cure, is it well ever to operate in an attempt to obtain a better result so that the eyes may be parallel without lenses?

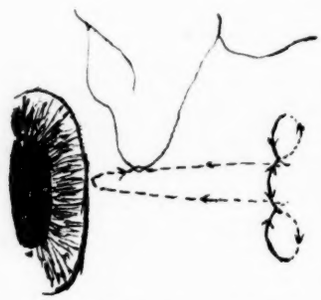

Fig. 2.—Method of inserting suture and location of knot if there is only one point of anchorage in the sclera.

Practically all answer this negatively. Some would operate for the remaining heterophoria present, especially if it is in high degree. Weeks operates where prisms are required, otherwise not.

What do you consider the best age for operation if a child from two to five years old develops squint and the proper lenses (if any are required) and exercises do not correct it? a. If a child has squinted since birth or within a few months of birth—so-called congenital strabismus? Is it a good plan in such cases to make an early approximate correction under general anesthesia?

Among those who consider operation advisable at as early a time as it is found that other means will fail are Holmes, Nance, Savage, Ziegler, Dean, King, Donovan, Dodd, Melville Black, Veasey, Bradfield, Seabrook, Carroll, Hills and Theobald. About 20 per cent. of the observers, among whom are Rogers, Hale, Roy, Baker, Culver, Snyder and Ellet, choose from 5 to 6 years as the best age for operation where good results may be expected. About another 20 per cent. prefer from 7 to 8 years. About 30 per cent. think from 10 to 12 years the best time. Knapp, Hood, Hill and Crane operate as early as the second and third years. A majority of

the answers indicates that if the child has squinted since birth, or within a few months from that time, operation should be performed earlier than if the squint had developed later. Others advise waiting until various ages. A large majority of answers show that many do not believe in an approximate correction under general anesthesia, while some claim good results from this in certain cases, especially those of high degree, where other means have absolutely failed. When all means have failed, if the vision and field of rotation are good in each eye, especially if it is possible to develop fusion tendency by the amblyoscope, I think it advisable to obtain an early approximate correction under general anesthesia in order to assist the other factors in producing parallelism of the optic axes. It is well to be very careful not to overcorrect in cases of convergent squint.

In what percentage of your operative strabismic cases is binocular single vision obtained—extreme age limit, if any?

The percentages of success in obtaining binocular single vision vary greatly. Some claim to obtain it in scarcely any, others in a very large proportion of cases. The answers, as a whole, indicate that binocular single vision is often obtained. Several give an age limit from 8 to 10 to 15 years or older. Some cite instances where binocular single vision was obtained in adult life. Greenwood cites the case of a patient 20 years old; Würdemann one of 25; Wells one of 25; Hulen one of 39; Snyder one of 45, and Vail one of 50, each of whom recovered his binocular vision power. Several express the opinion that there is no age limit in these cases, and that binocular single vision might be obtained at any age. Many claimed that their recent increase of successes is the result of experience and the employment of better methods.

In what percentage of your cases do you use a general anesthetic?

A majority prefer the use of local anesthetics, except when advancements are to be performed on small or uncontrollable children or very nervous adults. Several use local anesthesia only when the child's age exceeds 6 to 8 years, as Weeks, Carrow and White. Others choose from 10 to 13 years as the usual age after which it is wise to use local anesthesia. Several never use general anesthetics for tenotomies, but always for advancements.

DISCUSSION.

DR. G. C. SAVAGE, Nashville, said that in treating simple heterophoria the only object is to equalize the tonicity of opposing muscles. In heterophoria of the recti, with cyclophoria, there are two objects in view in the operation: first, to equalize the tonicity of the muscles; second, to change the plane of the muscle. In orthophoria there is absolute rest of the muscles and basal centers, in distant vision, for the tonicity of the muscles is equal. In distant vision these eyes would cross except for the basal centers connected with the externi, and these are the right and left fourth basal centers. Whether the surgeon operates in one way or another, the object must be to equalize the tonicity, and to relieve basal centers. The tonicity may be altered by partial tenotomy, advancement, or shortening. By partial tenotomy of the stronger muscle its tonicity is diminished. By reducing the tonicity of this muscle Dr. Savage has put the fourth basal center at rest. If instead of tenotomizing the internus, it is decided to shorten the externus, its tonicity is thereby increased, making it equal to the stronger one, and thus relieving the fourth basal center. Complete tenotomy, however, should never be done. The LaGlieze operation is far beyond any other advancement operation that has thus far been devised. It is done without severing the tendon, the muscle being made to overlap its original site of attachment. If the knot should become untied the last state of the patient is not worse than the first. It is, too, an easy operation to perform.

DR. WILLIAM C. POSEY, Philadelphia, referred to De Wecker capsular advancement operation as particularly applicable to cases in which there is a divergence of not more than ten degrees. This operation causes not so much reaction as that which follows the advancement of the muscle itself, no such disfigurement and no limitation of rotation of the eye. He has employed it repeatedly, and believes that it is one of the best procedures for the correction of muscular anomalies. He thinks that the single stitch advancement operation, while technically most admirable, is not always to be depended on, as the muscle which demands advancement is so often thin and its tissues delicate, and he invariably employs the double stitch operation.

DR. JOHN E. WEEKS, New York, protested against the use of a stitch that contracts tendon and muscle and bunches them up into a cord; the single stitch does this. When the tendon and muscle are doubled up the reattachment is not a proper one; it takes place at a few points only, at and near the middle of the original insertion. The subsequent contraction of the muscle can not influence the movement of the eyeball as it should. One should select an operation that will spread the muscle out and permit of a broad linear reattachment.

DR. J. A. L. BRADFIELD, La Crosse, Wis., said that in cases of internal squint combined with hypertrophia, operation on the superior or inferior recti usually is of more importance than operation on the internal and external recti muscles.

DR. MARK D. STEVENSON said that the chief objection to the tucking operation advocated by Dr. Savage, lies in the unsightliness of the eye for a long time after the operation. These patients, often operated on for cosmetic purposes, are particularly sensitive just after an operation and do not like the lumpy appearance of the bunched muscle. There is no danger in cutting away the superfluous muscle tissue, which otherwise would take a long time to disappear, as at least an approximately good result may always be obtained. When the capsule and conjunctiva are included with the muscle in the loops of the suture, there can not possibly be much bunching of the muscle. This can be regulated somewhat by the distance between the two points of anchorage in the sclera. If the suture is left in one week, there is formed a broad, strong attachment of the muscle which need never occasion any fear of its slipping. Good scleral anchorage of the suture can nearly always be obtained, but the great difficulty has been to find a suture that would securely hold the tendon or muscle in place until it became reattached to the globe. Sutures that do not have a loop so as to securely grasp the muscle are very liable to cut their way between the fibers. Since there is no means of knowing how much the suture migh slip in such cases, it is impossible to know how much to over correct.

THE VALUE OF VARIOUS FORMS OF HEMOGLOBINOMETERS TO THE GENERAL PRACTITIONER*

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AND
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We have undertaken this study because the general practitioner as a rule looks on hemoglobin instruments in general as a sort of medical toy, to be used largely by the consultant, and because we believe that the use of these instruments is practicable and that it does not take more time, nor nearly as much time with some forms, as is wasted over every patient by each of us.

In 1899 one of us read a paper before the Pennsyl-

* Read in the Section on Practice of Medicine of the American Medical Association, at the Fifty-sixth Annual Session, July, 1905.

vania Medical Society in which the following points were noted:

1. The necessity of blood instruments becoming part of the equipment of every practitioner.

2. The value of various blood examinations as pointing out the true diagnosis and treatment in many cases.

3. The fact that blood examinations done in a routine manner do not take more time than is constantly wasted in gossip with each patient.

We believe these points were well taken and that they are daily becoming better recognized. In order that we may have certain grounds for the choice of the particular instrument to be used we undertook the study of the Fleischel, the Dare and the Tallquist hemoglobin scale. The Oliver was not studied because the three instruments named above are the most widely used in this country and seem to be all-sufficient. The descriptions of each instrument and directions for their use can be found in all of the text-books on blood technic, and the reader is referred to them for information.

COMPARISON OF ESTIMATES BY DIFFERENT INSTRUMENTS.

Case.	Examiner.	Fleischel.	Dare.	Tallquist.	Gowers.	Case.	Examiner.	Fleischel.	Dare.	Tallquist.	Gowers.
1.—	M.	88	82	80	85	27.—	M.	78	86	80	..
	F.	80	84	80	80		L.	80	84	80	..
2.—	M.	80	76	80	80	28.—	M.	90	90	90	..
	F.	82	76	80	82		F.	88	92	90	..
	C.	76	74	80	80		H.	84	93	..	..
3.—	M.	82	84	80	84	29.—	M.	80	80	80	..
	F.	88	82	80	84		F.	82	84	75	..
4.—	M.	84	86	85	80	30.—	M.	82	88	85	85
	F.	88	86	85	88		F.	80	84	85	85
5.—	M.	76	72	75	75	31.—	M.	64	68	65	65
	F.	70	72	70	75		F.	66	68	65	68
	H.	80	74	70	78		L.	62	66	65	65
6.—	M.	40	42	50	..	32.—	M.	80	82	85	75
	R.	40	42	50	..		L.	78	84	85	75
7.—	M.	90	90	60	..	33.—	M.	72	73	75	74
	F.	88	85	70	..		F.	78	74	75	74
8.—	M.	87	90	90	..		L.	70	72	75	78
	H.	86	88	85	..	34.—	M.	80	80	85	82
9.—	M.	92	94	95	..		F.	84	82	85	84
	L.	84	85	86	..		S.	88	81	85	84
10.—	M.	82	75	80	..	35.—	M.	88	86	85	85
	L.	86	80	80	..		F.	92	86	85	86
11.—	M.	42	60	50	..		S.	96	86	85	86
	L.	45	60	45	..	36.—	M.	54	52	50	..
12.—	M.	65	65	65	..		R.	56	50	50	..
	R.	65	65	65	..		L.	50	52	50	..
13.—	M.	72	76	75	..	37.—	M.	62	58	60	..
	R.	74	78	75	..		L.	60	58	60	..
14.—	M.	84	85	85	..	38.—	M.	72	79	70	..
	R.	83	86	85	..		L.	74	79	70	..
15.—	M.	86	88	85	..	39.—	M.	80	75	80	..
	R.	85	88	85	..		H.	86	84	80	..
16.—	M.	72	74	75	..	40.—	M.	80	83	80	..
	F.	72	75	75	..		H.	82	85	80	..
	S.	76	80	75	..	41.—	M.	50	52	50	..
17.—	M.	72	74	75	..		H.	55	54	50	..
	F.	72	75	75	..	42.—	M.	65	60	65	..
	S.	76	80	80	..		H.	65	64	65	..
18.—	M.	82	86	80	..	43.—	M.	86	85	85	87
	F.	80	83	80	..		F.	82	85	85	87
	S.	82	84	80	..	44.—	M.	78	75	75	78
19.—	M.	76	78	80	..		F.	78	74	75	76
	L.	74	78	80	..	45.—	M.	83	84	85	84
20.—	M.	52	58	60	..		F.	79	84	80	86
	L.	58	56	60	..	46.—	M.	79	78	75	78
21.—	M.	78	76	80	..		F.	72	76	75	74
	L.	76	76	80	..		S.	75	78	75	76
22.—	M.	77	73	75	..	47.—	M.	88	86	85	86
	L.	72	75	70	..		S.	82	86	85	84
23.—	M.	70	74	70	..	48.—	M.	84	82	85	85
	L.	73	76	75	..		S.	80	82	85	84
24.—	M.	65	63	60	..	49.—	M.	86	80	85	82
	L.	67	65	65	..		F.	82	84	85	82
25.—	M.	40	38	40	..	50.—	M.	73	72	65	60
	B.	38	38	40	..		F.	73	70	65	65
26.—	M.	76	80	80	..		F.	73	68	65	64
	L.	80	82	80	..						

The studies were made mostly in the wards of St. Timothy's Hospital, Roxborough, Philadelphia. Fifty cases were studied with each instrument. Each case was studied at the same time with separate instruments. Recognizing that the personal element could play a part in the reading of any one of the instruments, because a given individual might more readily use one instrument than another, the observations were always made simultaneously by at least two individuals and frequently by three, and the results compared. Dr. Marcellus was used as the basis of comparison in all the cases and his observations are found in each estimate.

In the Tallquist readings the percentage is frequently estimated at 85, that is, between 80 and 90; or 75, between 70 and 80.

In order that an individual might not be prejudiced in the use of any given instrument, the reading was done in the following manner: First the blood was examined by the Fleischel, the scale being covered. Then the Dare instrument was used and the scale was not consulted. Finally, the Tallquist was used. This was done because the scale of the Tallquist is always before the observer. If a known percentage is present, one is very apt to deceive himself in the use of an instrument afterward in the same case. The reading of each instrument was then noted and the results compared.

DIFFERENCES IN THE READING OF THE DIFFERENT INSTRUMENTS WHEN USED BY A SINGLE INDIVIDUAL.

Fleischel and Dare: 6 4 2 2 4 2 0 3 2 7 18
0 4 1 2 2 2=61 .....Average 3.3
Fleischel and Tallquist: 8 0 2 1 1 10 30 3 3
2 8 0 3 0 1 3 3=69.
Dare and Tallquist: 2 4 4 1 3 8 30 0 1 5
10 0 1 1 3 1 1=75.
Dare and Gower: 3 6 0 6 3 3 3 7 1 2 1 2
3 0 0 2=40.
Fleischel and Dare: 4 2 6 2 4 4 2 2 4 12 0
0 6 4 2 1 0 2 2=65.
Fleischel and Tallquist: 2 6 8 2 2 0 5 0 4 2
0 0 3 1 5 3 5 4=55.....Average dif., 3.1
Dare and Tallquist: 2 2 2 2 4 3 2 0 6 0 0
3 3 3 2 5 1=46.
Dare and Gower: 5 2 8=15 .....Average dif., 3.4
Fleischel and Dare: 4 7 5 3 2 5 1 3 1 1 2
2 6 1=39.
Fleischel and Tallquist: 2 2 0 0 0 0 1 3 2 4
3 1 1 8=27.
Dare and Tallquist: 2 9 3 3 2 5 0 0 1 3 1
3 5 7=44. .....Average dif., 3.3

In the fifty observations made by a single individual the variations seem to be very slight, indeed. If the reading is done with the Fleischel and Dare, the average difference in fifty cases was 3.3 per cent., with Fleischel and Tallquist 3.2 per cent., with Dare and Tallquist 3.3 per cent.

PERSONAL DIFFERENCES IN READINGS OF GOWER, DARE, FLEISCHEL AND TALLQUIST (MARCELLUS AS STANDARD).

Tallquist: 5 0 0 0 0 5 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 5 0 0 0 0 0 0
0 0 0 0 0 0 0 5 5=0.5.
Fleischel: 8 4 4 8 6 4 0 2 8 1 12 4 0 0
2 2 1 0 4 0 4 0 2 2 6 2 5 3 6 4
4 0 0 2 2 4 2 2 2 2 2 2 2 6 2 4
8 4 8 2 4 2 2 6 2 5 3 4 0 4 7 4
Dif. 2,9 per cent.
Dare: 2 2 2 0 2 0 5 2 1 15 0 0 2 2 0 1
2 2 2 6 1 6 1 3 2 0 2 0 2 2 0
2 2 4 4 2 0 2 2 1 1 2 2 0 0
0 0 1 2 2 4 4 0 1 0 2 0 0 0 2...
1.85 per cent.

The personal differences in the use of the different instruments is also seen to be extremely slight. With the Dare the difference was 1.85 per cent, with the Fleischel 2.9 per cent., with the Tallquist 1 per cent. It is fair to state that the Tallquist shows a less percentage of personal differences, because there is no opportunity to judge of less than 5 per cent. difference. The greatest personal differences were with Dare, 15 per cent.; with Tallquist, 10 per cent.; with Fleischel, 8 per cent. The readings of the Tallquist scale were the same in 78 per cent. of the cases, in Fleischel 0.5 per cent., in the Dare 22 per cent. It will therefore be seen that the readings by different individuals is least likely to be just the same with the Fleischel instrument, but, as shown above, the differences are so slight that this is not a fault which interferes with the practical use of the instrument.

It will, therefore, be seen that, so far as practical

purposes are, any one of the three instruments is sufficient.

The Dare and the Fleischel allow of more accurate fractional reading because of the arrangement of the scale. All of the scales are accurate.

It appears to us that the advantages of the various instruments may be fairly stated as follows: Of the Tallquist scale, first, the cost is much less, $1.50; secondly, the bulk is less, it may be carried in the inside coat pocket at all times without inconvenience.

The first advantage of the Dare and of the Fleischel is that both can be used either by day or night. The Dare is less bulky than the Fleischel and does not need a particularly darkened room for its use.

The greatest disadvantage of the Tallquist is that one is forced to use it in daylight. The second disadvantage is that an accurate observation can not be made between the multiples of ten, and one therefore feels less sure of the result. The disadvantages of both the Dare and Fleischel are, first, the cost (about $20), and, second, the bulk, though the Dare is less bulky than the Fleischel. In conclusion, we may say:

1. Any one of the instruments studied by us is sufficiently accurate for practical purposes.

2. No practitioner should neglect to use one of these instruments. The Tallquist scale is cheap and convenient.

3. The Tallquist scale can be used for routine observations, and either of the other instruments for detailed and more accurate work.

4. The Dare instrument is just as accurate as the Fleischel, and takes much less time to manipulate.

5. For the general practitioner, the value of these instruments may be fairly arranged as Tallquist, Dare and Fleischel.

A STUDY OF THE METABOLISM OF ATROPHIC INFANTS AND CHILDREN.*

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METABOLISM OBSERVATIONS ON INFANTS.

Infant's and children's metabolism has not been thoroughly investigated. The importance of such work has long been recognized, but the difficulties have appeared to be almost insurmountable. Hauser[1] reviewed the work which had been done on this subject up to 1900. In this summary, he called attention to numerous errors in the work and to the incompleteness and inaccuracy of many of the results. Metabolism investigations have little or no value unless continued uninterruptedly for several days. It is essential that the diet should remain unchanged and that the feces and urine should be completely segregated and the entire quantity of each collected during this period.

SOURCES OF ERROR, AVOIDABLE AND UNAVOIDABLE.

The chief difficulty is to collect the entire quantity of feces and urine separately. In most of the reported investigations there was either a direct loss of feces or of urine, or some of the urine escaped into the feces. In some of the earlier investigations the feces were collected on the baby's napkin and afterwards scraped off; this method, of course, resulted in an appreciable loss. In some instances the observations were restricted to one or two days, too short a time to insure accurate results. It was a long time before a satisfactory method was discovered for separating the feces of the metabolism period from the feces which belonged to the periods preceding and following it. Some of the earlier methods for the determination of fat and nitrogen were inaccurate. In some cases the food was not analyzed by the investigator, but analyses were accepted which had been made by other observers. In other cases, the usual diet was quite different from that of the metabolism period and no time was allowed for the organism to become accustomed to the change. In some instances in which the child was on a varied diet, the diet was suddenly restricted in order to reduce the number of analyses; such changes are apt to diminish the appetite and otherwise to affect the metabolism. Sometimes a quantity of food sufficient to last through the observation was prepared and samples of this food selected for analysis. This reduced the number of analyses, but the patient had to eat stale food, which may have influenced metabolism.

In addition to these errors, there still remain some that are unavoidable to a great extent and which alter the results more or less. Of these the following are the most important:

1. The effects produced on the metabolism by restraint and unusual surroundings.

2. Errors due to defects in the methods used to segregate the feces and urine of the metabolism period.

One of the ill effects which has been attributed to restraint and unusual surroundings is, that often during the time in which the metabolism is studied the feces are more watery and are passed more frequently than usual. This effect was not apparent in any of the observations which I am about to describe. In the first case, that of a child four and one-half years old, there was no restraint. Her daily habits and surroundings were unchanged. She remained at home and carried on her accustomed occupations. For the most part she remained in bed because of her condition. A trained nurse who had attended her for more than a year, continued to have the entire charge of her during the observations. This nurse was one whom I had employed many times. She understood perfectly what was required of her and I felt perfect confidence in her reliability.

In the second case, an infant one year old, the effects of restraint were rarely apparent after the first few hours. He played with toys and was happy and contented most of the time. He was always eager for his food and there was no apparent change in the number or character of the dejections with the exception of those which contained the charcoal which was added to the food to segregate the feces. He had not been accustomed to much attention, so that the constant attendance of a nurse was a source of great pleasure to him. I should say that the restraint and changed surroundings produced in his case a minimum amount of disturbance. The nurse in charge of the infant was exceptionally well adapted to the task. She was intelligent, very patient and absolutely trustworthy. During a four days' observation she never left the room for more than a few minutes at a time and she was up many times each night to see that everything was in order. A circumstance of great importance was that both nurses were deeply interested in the work. It is

* This work was awarded the Dalton Prize by the Massachusetts General Hospital.

1. O. Hauser: (references to literature) Die Neueren Arbeiten über den Stoffwechsel beim Kinde. Speziell beim Säugling Zeits. f. Diatet. u. physikal. Therapie, vol. iii, 1899-1900.

not going too far to say that the success of the work depended on these two nurses.

In my observations to distinguish the feces of the metabolism period, a weighed quantity of charcoal was added to the food at the beginning of each metabolism observation and to the first food which was given six hours after the close of each observation. Charcoal has a tendency to cause watery movements. To avoid this it should be finely powdered and given in the form of an emulsion and in not too large quantities. Sometimes only a portion of a dejection contains charcoal and the remaining portion looks as usual. It is not only difficult or perhaps impossible in such a case to separate, with absolute accuracy, the feces of the metabolism period from those immediately preceding or following it, but in some cases it is probable that the increased peristalsis, due to the charcoal, hurries a portion of the charcoal through the intestines in advance of the rest. This may become mixed with some of the feces which do not belong to the metabolism period; or if at the end of the period with feces that should be retained, but which in consequence of the presence of charcoal would be discarded. In this way, an error would be introduced that could not be rectified. Chocolate has been used by Bendix[2] and others in place of charcoal. This introduces an appreciable error, unless an equal quantity is reserved for analysis and the results included with the analysis of the food. This necessitates additional determinations of fat and nitrogen. I used chocolate at the beginning of one observation and charcoal at the end. The chocolate contained 0.1978 grm. of nitrogen and 2.6509 grm. of fat. This was equivalent to a little over 1 per cent. of the total nitrogen in the food and to about 2.5 per cent. of the total fat.

The method employed to segregate the urine in metabolism observations in adults can not be employed in similar observations in infants. In the case of adults, no food is taken for twelve or more hours preceding the observation. This is accomplished without inconvenience to the patients by beginning the observation in the early morning. This gives time for the products of metabolism which belong to the period preceding the metabolism observation to become excreted by the kidneys. The urine that is passed first in the morning is therefore discarded. The observation is concluded at the same time in the morning and the first urine passed is retained. Infants are necessarily fed at short intervals and prolonged fasting is therefore impracticable. This difficulty is probably obviated to a great extent by the fact that the infant takes the same quantity and kind of food at regular intervals. If, therefore, the infant's diet has remained unchanged for several days preceding the observation, it is probable that the products of metabolism which are excreted in the urine during a given twenty-four hours would approximate those of a corresponding twenty-four hours. The plan which I adopted was to omit one feeding before beginning the observation, and to begin to collect the urine about one hour after the first feeding was given. At the close of the observation the urine was collected for an hour after the last feeding.

In the case of the first child the diet was unchanged for at least two or three weeks before each observation was begun. In the first observation the diet was arranged primarily to conform to the digestion and appetite of the patient, rather than to furnish a certain number of calories, with a suitable proportion of proteids, fat and carbohydrates. It had been found by observation that certain things were digested better than others, and the diet consisted of these substances.

In the second observation, made a month later, the proteids and carbohydrates were increased and the fat was diminished. These changes were made more than two weeks before the second observation was begun, so that the organism had become accustomed to the changes. In the case of the infant the only change that was made was to increase the quantity of food during the second observation. This change was made at least a week before the second observation was begun.

To determine the quantity of nitrogen and fat that was actually ingested by the infant, the nursing bottle and nipple were rinsed with distilled water after each feeding and the rinsings were reserved for analysis. The nitrogen and fat were determined in the rinsings and the results were deducted from the total nitrogen and fat of the food.

Pepsin was used in the infant's food for both the first and second observations. An equal portion of pepsin was reserved for analysis in each observation. These two portions were mixed together and one set of fat determinations served for both observations. The nitrogen was determined as usual, that is, two determinations for each month. The results were added to those of the food.

A loss of urine or of feces is reported in every published observation on infant's metabolism with which I am familiar. I decided that if any such loss occurred during my investigations I would discard the results. A loss of urine occurred in three investigations not included in this paper, twice on the first day and once at the end of the fourth day. These observations were discarded. In the four metabolism investigations which are here reported there was absolutely no loss of urine or feces.

HISTORY OF CASE 1.

The first case was so interesting clinically that I give a brief account of it. I obtained the following history from the trained nurse who had attended the child for a year and a half previous to the time that I was asked to see her.

History.—Female, aged 4½ years, birth weight nine pounds, normal infant, breast fed until 7 months old. She gained well during this time. At 7 months, she was given barley water and milk, with one feeding of a proprietary food. Later this was increased to several feedings of the same food, with milk. The infant apparently did well and grew very fat. Up to the age of 22 months she had no illness, except influenza at 9 months. At 22 months she began to have indigestion. She was still taking the proprietary food, in addition to her other diet. A prominence of the abdomen was observed at this time. During the next six months she gained but little and her digestion was impaired. At this time, 2 years and 4 months old, she was seen by a specialist, who diagnosed the condition as intestinal indigestion. During the succeeding seven or eight months her weight remained about the same, and once in two or three months she had attacks of acute intestinal disturbance, consisting of fever, diarrhea and rapid loss of weight. During these attacks the food was reduced, and for some time afterward the diet was much restricted. When she was 3 years and 4 months old, she had such an attack, associated with bronchial catarrh. This attack appears to have been severer than any previous one. A slight edema of feet, hands and face was noted for the first time, and later the abdomen became enlarged and measured 25 inches. The quantity of urine in 24

2. B. Bendix: Beiträge zum Stoffwechsel des Säuglings, Jahr. f. Kinderheilkunde, vol. xliii, 1896. Weitere Beiträge zum Stoffwechsel des Säuglings. Jahr. f. Kinderheilkunde, vol. xlvi 1898.

hours did not exceed 20 ounces, and at one time was much less. The dejections were loose or watery, with a great deal of mucus in them, and had a very strong odor. This condition lasted for several weeks; then the edema subsided and her weight was found to be 25 pounds. She was at this time 3½ years old. The urine was examined during this attack and a few casts were found. The temperature during the attack was normal. The digestion gradually improved and the dejections became normal in appearance, except that the color was pale. The next attack occurred when she was 3 years and 10 months old. There had been an interval of about three months between these attacks. This attack was not accompanied by edema, it lasted about one week, and she lost 2½ pounds. Just before this attack her weight was 26 pounds, 12 ounces. Two months later (4 years old) she weighed 28 pounds, 4 ounces. The abdomen measured 19 inches. She digested well. A month later she had another attack, not a very bad one, but she was unable to digest solid food and lost one-half pound a week for three weeks. Then edema appeared in face, feet and hands. The amount of urine was 29 ounces in 24 hours. Dejections were watery and contained mucus. The urine diminished in quantity during several days and the abdomen enlarged. The watery dejections increased in number. The urine diminished to 3 ounces on one day and then gradually increased in quantity after hot air baths, etc. The edema was very marked—general anasarca and ascites. Abdominal paracentesis was performed and 18 ounces of clear pale fluid was withdrawn. The temperature was normal during the attack. The urine showed a few hyaline casts. A second examination a few days later showed no albumin, no casts. The abdomen was aspirated a second time, two days later, and about 30 ounces of fluid withdrawn. The daily quantity of urine for about a week did not exceed 9 ounces. After the digestion improved the amount of urine increased to 50 or 60 ounces daily for a few days and the edema disappeared. About one month after the beginning of this attack, she was passing on an average from 40 to 50 ounces of urine each day, and she continued to pass this excessive quantity for several months afterwards. Her weight at this time, after the edema had disappeared, was 25 pounds, 3 ounces, and her age was 4 years and 4 months. In the next three weeks, her weight increased to 27 pounds and her digestion appeared to be as good as at any previous time.

Discussion of Diagnosis.—I saw the child in consultation with Dr. Herman T. Baldwin, of Chestnut Hill, for the first time, at this period. A number of physicians had seen her at different times and had not agreed on a diagnosis. Interstitial nephritis and tubercular peritonitis had been considered among the diagnoses. From the history and physical examination it seemed to me very unlikely that it was tubercular peritonitis, and repeated urine examinations made by Prof. E. S. Wood during the next few weeks failed to detect interstitial nephritis. It appeared to me to be a case of chronic intestinal disturbance similar to infantile atrophy and associated with periodic acute exacerbations of intestinal indigestion. The occurrence of so marked an edema and ascites under such conditions was unusual, and the persistent excretion of such a large daily quantity of urine made me suspect that the kidneys were not normal, although this symptom was present in similar cases that I had seen. I attributed any alterations in the kidneys, if such were present, to the irritative effect produced by the excretion of some substance or substances unknown, which had resulted from prolonged disturbances in metabolism.

Examination.—Physical examination did not show anything abnormal aside from emaciation, a moderate degree of pallor of the skin and visible mucous membranes, and very little edema of the hands and feet. It seemed to me that a study of the child's metabolism might throw light on the nature of the process. It also offered a reasonable hope that, by means of the knowledge thus gained, the diet could be adjusted in such a way as to evert the periodic attacks of intestinal indigestion.

Course of the Disease.—These anticipations were fulfilled, to some extent, by the result of two metabolism observations which were undertaken shortly afterward. The child's digestion steadily improved and she gained in weight during the succeeding five months. At the end of five months she had gained 4½ pounds and weighed 31½ pounds. Her weight at this time exceeded by several pounds that of any previous time, and she had never in the course of her illness had so little digestive disturbance. In May, there was a period of extreme heat, which lasted for ten days, and was responsible for a great many cases of diarrhea and vomiting among infants and children. This child had an attack which lasted several days and left her considerably prostrated. About three weeks after the attack, she was removed to the seashore and appeared to be improving in general condition. A few days afterward, she was taken ill quite suddenly, had a high temperature and a fleeting, patchy erythema which disappeared within a few hours and was not followed by desquamation. The throat was not abnormal and no symptoms appeared which threw any light on the diagnosis. The temperature remained elevated for three days. On the fourth day, the urine became markedly diminished, showed a faint trace of albumin, no sugar, and nothing abnormal in the sediment. The child became stupid and finally unconscious within 24 hours, and the urine was practically suppressed. She was treated energetically with hot air baths and pilocarpin; her bowels were moved freely, and as much water was introduced into her system as possible. She roused somewhat on the following day and recognized her surroundings at times. This improvement only lasted a few hours and then she became unconscious and all treatment was without effect. She died on the sixth day after the acute onset of the disease, with all of the symptoms of uremic intoxication.

Autopsy.—I performed an autopsy about six hours after death. The macroscopic appearances of the organs were not markedly abnormal. Tuberculosis and tubercular peritonitis had been suggested at different times by various physicians, but there was no evidence whatever of tuberculosis anywhere. Microscopically the only abnormalities of any consequence were very marked fatty changes in the renal epithelium, especially of the convoluted tubules. There was no evidence of acute or chronic inflammation in the kidneys. The liver contained an abnormally large quantity of fat, but otherwise was not abnormal. The spleen contained relatively few cellular elements, so that the reticulum was more prominent than usual. Otherwise nothing of consequence was apparent. The lungs and heart and lymph nodes and peritoneum were not abnormal.

METHOD EMPLOYED IN CASE 1.

Two metabolism observations were made on this child. Each observation lasted for four days. The first observation began on Dec. 18, 1902, and ended on Dec. 22, 1902. The weight at the beginning of the first observation was 11,716 grams (25 lbs. 14 ozs.), and at the end was 11,942 grams (26 lbs. 6 ozs.).

The method employed for distinguishing the feces of the metabolism period was the same as that used in similar observations on adults. The observation was begun in the early morning, after twelve hours' abstinence from food. Charcoal was given with the first feeding and the first dejection which contained charcoal was reserved for analysis. At the close of the observation food was withheld for twelve hours, and charcoal was added to the first feeding. The feces were collected for analysis until the charcoal appeared. At the beginning of the observation the first urine passed in the morning was discarded and at the end of the observation it was retained. The weight of the fresh food ingested during the four days' observation was 5,217 grams. The weight of the same food after drying was 908.5 grams. The weight of the dried feces for the same period was 138.79 grams.

The second observation began on Jan. 27, 1903, and ended on Jan. 31, 1903. The weight at the beginning of the second observation was 12,452 grams (27 lbs. 8 oz.), and at the end was 12,791 grams (28 lbs. 4 oz.). The weight of the fresh food ingested during the four

days' observation was 6517 grams. The weight of the same food after drying was 1292.5 grams. The weight of the dried feces for the same period was 111.56 grams.

In both metabolism observations on this child, the gain in weight can not be ascribed solely to a new formation of tissue. The presence of a slight amount of edema in the tissues might account for variations of several ounces in the weight. In addition to this, the child was accustomed to receive an injection of water each day in order to obtain satisfactory movements from the bowels. It is possible that some of this water may have been retained in the intestines.

The following method was employed in both observations on this child and the results are arranged for comparison in parallel columns in Tables 1, 2 and 3. The food, both liquid and dry, was weighed each day, in two equal portions, one for the child and one for analysis. When dried substances like rusks or crackers were weighed, each large piece was broken into several smaller pieces and alternate pieces were used for analysis and for the child. Every particle of food was eaten in the presence of the nurse, who was ingenious and devised means to avoid loss of food; viz., butter was spread on the crackers, using a second cracker for a knife; both crackers were eaten; paper napkins were used to collect the crumbs, crumbs were then eaten; glasses containing cream, barley jelly or broth were rinsed with water, which was drunk by the child. The glasses containing liquids or semi-solids, reserved for analysis, were cleansed in the same way as those used by the child, so that the portion for analysis represented accurately the portion actually eaten. The child could always be induced to eat the quantity of food provided for the twenty-four hours, otherwise the work could not have been carried out. The same quantity was not always taken at corresponding meals, but the entire quantity was always consumed in the twenty-four hours.

The food corresponding to that which was eaten by the child each day, was acidulated with hydrochloric acid and evaporated on a steam bath. When almost dry, alcohol was added, and evaporated several times to drive out the water. The dried food was then ground to a fine powder; weighed; mixed thoroughly, and quartered down to a few grams for a single analysis. A similar procedure was adopted for a duplicate analysis. So that each test was made from a quartered sample weighing a few grams.

In my first metabolism observation on this child, I did not appreciate how much difficulty could be caused by the presence of filter paper in the food and feces. It was necessary to cleanse the patient after each dejection and to add the fecal matter thus obtained to the total quantity of feces. A weighed amount of filter paper was used for this purpose and this weight was deducted from the weight of the dried feces and food when computing the quantity of fat and nitrogen. The presence of filter paper in the food and feces made it very difficult to reduce them to a powder. It also introduced an error in the feces which I was only partially able to rectify. It was impossible to mix the powdered feces and filter paper so that each aliquot portion contained the same weight of feces and of filter paper. One sample would contain a little more feces and another would contain more filter paper. Two final determinations of the total fat in the feces showed a difference of about 5 per cent. This introduces an error of 2.5 per cent. This was in a second series of determinations. In the meantime, the feces had been mixed and quartered repeatedly for nitrogen determinations. Filter paper was not used in the subsequent observations. Instead the parts were cleansed by means of a rubber finger cot on the nurse's finger and the fecal matter was washed off the cot into the general receptacle; by this means none was lost.

The feces for each day were evaporated on a steam bath after acidulation with hydrochloric acid. The moist weight could not be determined. At the end of the four days' observation the drying was assisted by evaporating with alcohol several times. The feces afterwards were treated in the same manner as the food, i. e., ground to powder, weighed and quartered to a few grams for each analysis. Up to the time that the food and feces were powdered and weighed, the greatest care was taken that none should be lost. All dishes or apparatus that came in contact with the food or feces, were scraped and then washed with alcohol, the alcohol evaporated and the residue added to the food or feces as the case might be.

The child was accustomed to have enemata and without them the bowels did not move satisfactorily and she was liable to attacks of indigestion. The enemata were continued during the observations.

She was always required to pass urine before receiving an enema; and to avoid any loss of urine at the time of the movement, I arranged a simple device which succeeded perfectly. It consisted of a small tin funnel, which I flattened a little from side to side. A piece of rubber tubing was attached to the outlet and from thence led to a receptacle on the floor. During defecation the funnel was pressed firmly against the labia by means of a stout piece of twisted wire, which had a loop at one end through which the end of the funnel passed.

The urine was preserved with chloroform and made up to a definite volume so that analysis was simplified. The nitrogen was determined in the urine each day by Kjeldahl's method, using sulphuric acid, sulphate of potassium and sulphate of copper. In the case of the food and feces, a weighed portion of the dried substance was used. The urine nitrogen was determined in 5 c.c. of the diluted urine measured in a pipette. The same pipette was used in all determinations.

The fat in the food and feces was determined by the Soxhlet method, using petroleum ether. The petroleum ether was subjected to two distillations and tested for a residue before using. A weighed amount of the dried substance was treated with alcohol containing 2 per cent. of hydrochloric acid and evaporated almost to dryness; alcohol was then added and evaporated several times. When nearly dry, a quantity of sand sufficient thoroughly to separate the particles was stirred in and the mixture evaporated to dryness. The sand was thoroughly washed and ignited for several hours and a blank extraction made before it was used. In all fat determinations continuous extraction was maintained for from 48 to 72 hours. At the end of this time, fresh ether was added, extraction was continued for a time and then the ether was tested for a residue. Finally the ether containing the fat was evaporated and the flask and its contents were placed in a thermostat at 95° C. for several hours. After it was cooled and weighed the procedure was repeated and a second weighing made.

All the fat and nitrogen determinations were done

in duplicate. When the results disagreed, a second series of determinations was made.

The method of preparing the food for analysis was devised by McCrudden.[3]. This method was thoroughly tested by him and found to be accurate. McCrudden says:

> This makes but one analysis of the food necessary and permits giving the patient an unrestricted diet. The food given is always fresh, and the inaccuracy due to keeping is overcome by weighing the patient's food and that for analysis at the same time. . . . In quartering, the food is thoroughly mixed with a large spatula and then is made into a little circular pile a couple of inches high. The pile is divided into four nearly equal quarters. Two opposite quarters are rejected and the other two well mixed, made into another little pile and quartered again. The mixing and quartering are repeated until there is about enough food left for one set of analyses. Samples for duplicate and triplicate analysis are obtained in the same way.

The mixing and quartering can be done conveniently on a large plate of glass.

A series of heat determinations were made of the food. These tests were made in Prof. Norton's laboratory at the Massachusetts Institute of Technology. The determinations were made in a modified Berthelot's bomb under the direction and with the assistance of Prof. Norton. I am glad of this opportunity to thank him for his great kindness to me. It was my intention to have determined the heat in the food, feces and urine from each observation, but a satisfactory method for drying the urine without loss of nitrogen was not discovered until too late.

TABLE OF RESULTS IN CASE 1.

TABLE 1.

December, 1902. Nitrogen Determinations. January, 1903.

	Nitrogen in grams.	Nitrogen in grams.		Nitrogen in grams.	Nitrogen in grams.
908.5 grams dried food contained	.....	20.2235	1292.5 grams dried food contained	....	28.0545
Urine nitrogen,			Urine nitrogen,		
December 19	3.3038		January 28	4.2647	
December 20	3.8671		January 29	4.5212	
December 21	3.4515		January 30	4.5896	
December 22	3.6611		January 31	4.3502	
	14.2835			17.7257	
Feces nitro. (138.79 grams dried wt.)	5.0242		Feces nitro. (111.56 grams dried wt.)	5.9185	
Total nitrogen excreted in feces and urine	19.3077	19.3077	Total nitrogen excreted in feces and urine	23.6442	23.6442
		+0.9158			+4.4103

Summary.

24.84 per cent. of total nitrogen excreted in feces.
3.62 per cent. dried feces consistod of nitrogen.
15.27 per cent. by weight of dried feces to dried food.

Summary.

21.09 per cent. of total nitrogen excreted in feces.
5.30 per cent. of dried feces consisted of nitrogen.
8.63 per cent. by weight of dried feces to dried food.

ANALYSIS OF RESULTS IN CASE 1.

An analysis of Tables 1, 2 and 3 show certain results. There was almost one-third more fat in the food in December than in January, and a very marked difference in the percentage of fat in the feces in the two observations. In December, 19.05 per cent. of the dried food consisted of fat; in January, 9.95 per cent. consisted of fat. In December, 40.19 per cent. of the fat ingested appeared in the feces; in January, 16.45 per cent appeared in the feces.

Contrary to what one would expect, the excessive quantity of fat in the diet in December and its markedly deficient absorption by the intestines did not appear to interfere very much with the absorption of the nitrogen. A comparison of nitrogen absorption in December and January shows 24.84 per cent. nitrogen excreted in the feces in December and 21.09 per cent. nitrogen excreted in the feces in January. This is quite striking, because it is believed that excessive quantities of fat not only impair the fat digesting and absorbing functions, but also interfere with the other digestive functions. The fat offers a mechanical hindrance to the action of the other ferments on the food and gives rise to abnormal decomposition products. It must be remembered, when comparing the December and January results, that the conditions were dissimilar in these two observations. In December, the child was recovering from a severe digestive disturbance. In

TABLE 2.

December, 1902. Fat Determinations. January, 1903.

	Weight in grams.		Weight in grams.
908.5 grams of dried food contained	173.1096	1292.5 grams of dried food contained	128.6741
138.79 grams of dried feces contained	69.5797	111.56 grams of dried feces contained	21.1753

Summary.

40.19 per cent. of ingested fat excreted in feces.
19.05 per cent of the dried food consisted of fat.
50.13 per cent. of the dried feces consisted of fat.

Summary.

16.45 per cent. of ingested fat excreted in feces.
9.95 per cent. of the dried food consisted of fat.
18.98 per cent. of the dried feces consisted of fat.

TABLE 3.

December, 1902. Heat Determinations. January, 1903.

	temp. rise		temp. rise.
1 gram of dried food	2.15°	1 gram of dried food	1.975°
	large cal.		large cal.
2.15° rise temperature	5.12	1.975° rise temperature	4.7
908.5 grams of dried food	4651.5	1292.5 grams of dried food	6074.8
Calories per diem ingested	1162.9	Calories per diem ingested	1518.7
	temp. rise		temp. rise
1 gram of dried feces	2.57°	1 gram of dried feces	2.18°
	large cal.		large cal.
2.57° rise temperature	6.12	2.18° rise temperature	5.19
138.79 grams of dried feces	848.9	111.56 grams of dried feces	578.8
Calories per diem excreted in feces	212.2	Calories per diem excreted in feces	144.7

Summary.

Calories per diem ingested in food	1162.9	Calories per diem ingested in food	1518.7
Calories per diem excreted in feces	212.2	Calories per diem excreted in feces	144.7
Calories per diem actually absorbed	950.7	Calories per diem actually absorbed	1374.0
Calories per kilo weight per diem in food	98.3	Calories per kilo weight per diem in food	120.3
Calories per kilo weight per diem absorbed	80.3	Calories per kilo weight per diem absorbed	108.8
Gain in weight per diem in grams	56.5	Gain in weight per diem in grams	84.75

January both her general condition and her digestion were considerably improved. The food in January contained very much less fat than in December and was a very much more suitable one in the relative proportions of fat, proteids and carbohydrates. In December, the diet had not been adjusted, but articles had been added that previous experience had shown to agree with the patient.

A consideration of the distribution of the calories in the component parts of the food will show this clearly. The heats of combustion of the total quantity of food

3. American Journal of Medical Sciences, March, 1903.

taken in the December and in the January observations were accurately determined by means of a bomb-calorimeter. This permits a computation of the distribution of calories in the component parts of the food to be made with sufficient accuracy for purposes of comparison, which is all that is intended. The factor 6.25 was used to determine the amount of proteid material which corresponded to the nitrogen content of the food. This is incorrect for estimating the proteid in cream, but it was not possible to determine the nitrogen separately in the cream. The calories due to carbohydrates are estimated by difference. Table 4 shows the approximate distribution of the calories in the food for a single day in December and in January:

TABLE 4.

December.	Calories each day.	Approximate wt. in grams.	January.	Calories each day.	Approximate wt. in grams.
Proteid	129.5	31.5	Proteid	179.7	43.8
Fat	402.5	43.2	Fat	299.2	32.1
Carbohydrate	630.9	153.8	Carbohydrate	1039.8	253.6
Total	1162.9		Total	1518.7	
98.3 Calories per kilo per diem.			120.3 Calories per kilo per diem.		

The weight of the dried feces in December far exceeded the weight of the January feces, notwithstanding that much less food was ingested in December. Thus: December: Weight of dried food, 908.5 grams; of dried feces, 138.79 grams. January: Weight of dried food, 1292.5 grams; of dried feces, 111.56 grams.

This excess in December was due in part to the larger quantity of fat in the food, but the impaired state of the digestion and the general condition in December as compared with January must have exerted some effect on absorption.

In December, 50.13 per cent. of the weight of dried feces was fat; in January, 18.98 per cent. was fat.

Heat determinations of the food and feces in this case show that in December, 1162.9 calories were ingested each day and that 212.2 calories were lost in the feces each day. If one regards the difference as so many calories absolutely absorbed, it leaves 950.7 calories. This corresponds to 80.3 calories per kilo weight a day. Heat determinations of the food and feces in January show that 1518.7 calories were ingested each day and that 144.7 calories were lost in the feces. The difference is 1374 calories, or 108.8 calories per kilo weight a day. This number of calories per kilo is considerably more than is required to maintain the weight of a child of the age of this one. At any rate, in spite of impaired absorption, the child absorbed more than enough to maintain her weight; as a matter of fact, there was a steady gain in weight and improvement in general condition from this time until the following May.

HISTORY OF CASE 2.

The second case is that of an infant one year old, with a history of faulty feeding and chronic gastro-enteric disturbance. Physical examination showed very marked emaciation and a moderate degree of anemia. Nothing abnormal was detected in the various organs. The temperature was subnormal during a greater part of the time that the infant remained under observation. Weight 5490 grams (12 lbs. 2 oz.).

METHOD EMPLOYED IN CASE 2.

Two metabolism observations were made on this infant. Each observation lasted four days. The first observation began on Oct. 27, 1903, and ended on Oct. 31, 1903. The weight at the beginning of the first observation was 5955 grams (13 lbs. 2 oz.), and at the end was 6135 grams (13 lbs. 8½ oz.).

The infant received seven feedings in each twenty-four hours. The first feeding of the metabolism period consisted of 75 c.c. of whole milk and 75 c.c. of barley jelly. In order to differentiate the feces of the metabolism period, a few grams of powdered chocolate were dissolved in 70 c.c. of the milk and barley jelly mixture. Thirty-five cubic centimeters of this mixture were added to the 150 c.c. of the first feeding and the remaining 35 c.c. were reserved for analysis. Each subsequent feeding consisted of 100 c.c. of whole milk and 100 c.c. of barley jelly. The food was peptonized for ten minutes before each feeding.

The first dejection occurred at 4:30 p. m., October 27, and contained no chocolate. The second dejection occurred at 2:30 a. m., October 28, and was intimately mixed with chocolate. It was soft, smooth, chocolate brown in color and contained more fluid than normal. Following this, there were three additional dejections on October 28, at 7:30 a. m., 12:30 p. m., and at 3:30 p. m. These dejections contained less fluid than the first one, and the last one contained only a trace of chocolate. The subsequent dejections were yellow in color, of normal consistency and slightly curdled in appearance. There were two dejections daily after the first 24 hours. Three grams of charcoal were given with the first feeding six hours after the first observation was concluded.

The total weight of the dried feces for the four days' observation was 55.7418 grams. The total quantity of food taken during this time was 5550 c.c.

A second metabolism observation on the same infant began on Nov. 13, 1903, and ended on Nov. 17, 1903. The infant's weight at the beginning of the observation was 5825 grams (12 lbs. 14 oz.) and at the end was 6120 grams (13 lbs. 8 oz.).

The infant received seven feedings in each 24 hours. The first feeding of the metabolism period consisted of 100 c.c. of whole milk, 75 c.c. of barley jelly, and 35 c.c. of a mixture composed of 3 grams of willow charcoal suspended in 40 c.c. of mucilage of acacia. Each subsequent feeding consisted of 110 c.c. of whole milk and 110 c.c. of barley jelly. The food was peptonized for ten minutes before each feeding. There were four dejections in the first 24 hours. A small portion of the first dejection was mixed with charcoal. This portion was reserved for analysis and the remainder was discarded. The second dejection was completely blackened with charcoal. The dejections throughout the observation were partly formed and were well digested. After the first 24 hours, they averaged three in number daily. Charcoal was given in the first feeding six hours after the observation was concluded. In the course of the observation, the infant refused 120 c.c. of one feeding. This amount was added to the rinsings for analysis.

The total weight of the dried feces for the four days' observation was 76.4583 grams. The total quantity of food taken during this time was 6115 c.c. The daily quantity of urine passed during both observations was somewhat less than one liter. It averaged about 900 c.c. At the beginning of the second observation, the urine was found to be cloudy when passed. The reaction was acid; there was a trace of albumin present; sugar absent. The sediment was moderately heavy and was composed chiefly of pus corpuscles. A moderate num-

ber of caudate cells, corresponding in size to those which line the pelvis of the kidney, were present in the sediment. No casts were found. This pyelitis continued for several weeks. There was never any evidence that the kidney itself was affected. The patient's general condition, appetite and digestion were not noticeably affected and he gained in weight. There was never any edema. The temperature during the first few days was slightly elevated. Previous to this time, the temperature, as in many cases of atrophy, was oftener subnormal than normal. During the early stage of the pyelitis the temperature rose to normal. The cause of the pyelitis could not be determined and the condition would not have been suspected without the urinary examination.

The following method was employed in both observations on the infant, and the results are arranged for comparison in parallel columns in Tables 5, 6 and 7. A method which I devised for segregating and collecting the urine and feces will be described in a future publication.

Throughout the work, the same pipettes were used for measuring fluids. I mixed the food each day and measured the quantity of each feeding directly into the feeding bottles by means of pipettes. A certain quantity of the food was measured into a flask each day and reserved for analysis. A few drops of formalin were added and the mixture was kept on ice until needed for analysis. After each feeding, the nursing bottle and nipple were rinsed with distilled water and the rinsings were reserved for analysis. A few drops of formalin were added to preserve the rinsings.

The urine was collected in glass flasks. The flasks were changed at short intervals and the urine which they contained was poured into a large flask. The small collecting flasks were rinsed each time with a little distilled water. At the end of 24 hours these rinsings were added to the day's urine and the whole was made up to a standard quantity with distilled water. This was done to simplify the nitrogen calculation. The urine was preserved with a little chloroform. Nitrogen determinations in the urine were made each day to avoid any loss of nitrogen from decomposition. The urine was tested for albumin and sugar, and the sediment was examined before and after each observation.

The feces were collected in evaporating dishes and treated as previously described.

The nitrogen was determined in the food, rinsings and urine by Kjeldahl's method, using sulphuric acid, potassium or sodium sulphate, and copper sulphate. For this purpose 5 c.c. of the urine and food were taken for each analysis.

The nitrogen in the feces, pepsin and chocolate was determined in a weighed amount of the dried substance. Fat determinations were made by Soxhlet method. In the case of the milk mixture and rinsings from nursing bottles, 10 c.c. were used for each analysis. This quantity was spread on filter paper that had been extracted with ether previously. This was dried in the thermostat at 95° C. and subjected to 72 hours' continuous extraction. The fat was determined in weighed amounts of the feces, chocolate and pepsin by the method described in connection with the first series of metabolism observations.

ANALYSIS OF RESULTS OF CASE 2.

An analysis of Tables 5, 6 and 7 shows certain results. The composition of the food remained the same in both observations. In the second observation the quantity was increased. In October, the total quantity of food contained 106.72 grams of fat; in November, it contained 119.13 grams of fat. The percentage of fat in the food in October was 1.92 per cent. In November it was 1.95 per cent. Otherwise expressed, each liter

TABLE OF RESULTS IN CASE 2.

TABLE 5.

October, 1903. Nitrogen Determinations. November, 1903.

	Nitrogen in grams.	Nitrogen in grams.		Nitrogen in grams.	Nitrogen in grams.
5550. c.c. food contained		17.0625	6115. c.c. food contained		18.5262
Chocolate contained		0.1978	Pepsin contained		0.3540
Pepsin contained		0.3584			18.8802
		17.6187	Rinsings from feeding bottles contained		0.3171
Rinsings from feeding bottles contained		0.1277	Total nitrogen ingested		18.5631
Total nitrogen ingested		17.4910			
*Urine nitrogen—			Urine nitrogen,		
Oct. 28 (21 hrs.)	2.8478		November 14	3.3640	
Oct. 29	3.1025		November 15	3.4138	
Oct. 30	3.0154		November 16	3.2021	
Oct. 31 (27 hrs.)	3.5298		November 17	3.5632	
	12.5155			13.5431	
Feces nitrogen (55.7418 grams dried weight)	2.9848		Feces nitrogen (76.4583 grams dried weight)	2.9827	
Total nitrogen excreted in feces and urine	15.5003	15.5003	Total nitrogen excreted in feces and urine	16.4758	16.4758
		+1.9907			+2.0873

Summary.

17.06 per cent. of total nitrogen excreted in feces.
5.35 per cent. of dried feces consisted of nitrogen.
13.51 per cent. by weight of dried feces to dried food.

Summary.

15.79 per cent. of total nitrogen excreted in feces.
3.83 per cent. of dried feces consisted of nitrogen.
16.55 per cent. by weight of dried feces to dried food.

* The reason for such a marked apparent difference in the daily quantity of nitrogen excreted by the kidneys in the October observation is that on the first day the urine was collected for twenty-one hours, and on the fourth day for twenty-seven hours. This prevents a comparison of the nitrogen excretion of these two days with that of the other two days of the observation, but it does not alter the total excretion of nitrogen for the four days. It was necessary, in order to arrange my work, to begin the observation at about noon, and in the first observation there was an unavoidable delay of three hours. The only ways by which I could remedy the matter were either to shorten the time of collection of the urine for the first day, or else to postpone the observation. As it did not alter the result I chose the former method.

TABLE 6.

October, 1903. Fat Determinations. November, 1903.

	Weight in Grams.		Weight in Grams.
5550. c.c. of food contained (19.22 grams of fat per liter)	104.3955	6115. c.c. of food contained (19.48 grams of fat per liter.)	119.8540
Chocolate contained	2.6509	Pepsin contained	0.0915
Pepsin contained	0.0897		119.9455
(one set determinations for Oct. & Nov).	107.1361	Rinsings from feeding bottles contained	0.8100
Rinsings from feeding bottles contained	0.4163	Total fat ingested	119.1355
Total fat ingested	106.7198		
55.7418 grams of dried feces contained	12.7906	76.4583 grams of dried feces contained	27.7565

Summary.

11.80 per cent. of ingested fat excreted in feces.
1.92 per cent. of the food consisted of fat.
22.59 per cent. of the dried feces consisted of fat.

Summary.

23.30 per cent. of ingested fat excreted in feces.
1.95 per cent. of the food consisted of fat.
36.30 per cent. of the dried feces consisted of fat.

of food contained in October 19.22 grams of fat, and in November 19.48 grams of fat. It will be seen that the fat content was approximately the same in both observations. In November, there was a much greater loss of fat in the feces, and the weight of the dried feces was considerably more than in October. The appearance of the feces when passed was not dissimilar in the two experiments and looked much more normal as a rule than is usual in cases of atrophy.

In October, the dried feces weighed 55.74 grams and contained 11.80 per cent. of the fat ingested. In November, the dried feces weighed 76.45 grams and contained 23.30 per cent. of the ingested fat. Notwithstanding the increased quantity of feces in November and double the percentage of fat which they contained as compared with October, the percentage of nitrogen lost in the feces in November was less than in October. In October the feces contained 17.06 per cent. of the nitrogen ingested, and in November, 15.79 per cent.; so that the greater loss of fat in the feces in November did not increase the loss of nitrogen. In both observations, the nitrogen retention was about the same, viz.: October, + 1.9907 grams; November, + 2.0873 grams.

TABLE 7.

October, 1903. Heat Determinations.		November, 1903. Heat Determinations.	
	grm. dried wt.		grm. dried wt.
50. c.c. of food	3.7009	50. c.c. of food	3.7769
	rise temp.		rise temp.
3.7009 grams dried food	8.354°	3.7769 grms. dried food	8.659°
	large cal.		large cal.
8.354° rise temperature	19.881	8.659° rise temperature	20.609
5550. c.c. of food	2206.8	6115. c.c. of food	2520.4
Calories per diem in food	551.7	Calories per diem in food	630.1
Calories per liter in food	397.6	Calories per liter in food	412.1
Summary.		**Summary.**	
Calories per diem in food	551.7	Calories per diem in food	630.1
Calories per diem in rinsings	4.1	Calories per diem in rinsings	10.6
Calories per diem ingested	547.6	Calories per diem ingested	619.5
Calories per kilo. weight per diem ingested	90.5	Calories per kilo. weight per diem ingested	103.7
Gain in wt. in grms. per diem	45.	Gain in wt. in grms. per diem	73.75

There was no apparent difference in the infant's condition in the two observations. He ate, slept and digested about the same. In the interval between the first and second observations the urine was not examined, but as has been stated, at the beginning of the second observation a pyelitis was found. A little less urine was passed during the second observation than during the first, but the nitrogen excretion was not interfered with. The proportion of urine nitrogen to that of the food was about the same in both observations. In October, the nitrogen excreted in the urine was equivalent to 71.5 per cent. of the nitrogen in the food, and, in November, it was equivalent to 72.95 per cent. of the food nitrogen. So far as the absorption of fat in the two observations was concerned, it was evidently influenced by something besides the percentage of fat in the food. The second observation was as near a control of the first as it was possible to make it. The only difference was 125 c.c. more food each day, without any appreciable difference in its composition. The variation in the fat absorption without any discoverable reason, affords an instance of the impossibility of drawing accurate conclusions from a limited number of observations, even when the observations are very carefully carried through.

The heats of combustion of the total quantity of food taken in the October and in the November observations were accurately determined by means of a bomb-calorimeter. Table 8 gives an approximate estimation of the distribution of calories in the component parts of the food for a single day in each of the two observations. The factor 6.33 was used to convert the nitrogen into its equivalent of proteid. This is somewhat inaccurate because part of the proteid was present in a different form in the barley jelly. The results are sufficiently accurate for a rough comparison, which is all that is intended. The calories due to carbohydrate are estimated by difference.

TABLE 8.

October.	Calories each day.	Approximate wt. in grams.	November.	Calories each day.	Approximate wt. in grams.
Proteid	110.7	27.	Proteid	120.2	29.3
Fat	242.7	26.1	Fat	278.7	30.
Carbohydrate	198.2	48.3	Carbohydrate	231.2	56.4
Total	551.6		Total	630.1	
90.5 Calories per kilo each day.			103.7 Calories per kilo each day.		

VARIATIONS IN WEIGHT.

Conclusions derived from a consideration of the variations in weight during a metabolism observation of a few days' duration, are valueless unless the metabolism observation includes a respiration experiment. Without this, it is impossible to say to what a gain or loss of weight is due. In some cases, changes in weight are due to variations in the contents of the bladder and intestines at the beginning and at the end of the observation; in some cases water is retained in the organism. It has been shown by Rubner,[4] Freund[5] and others[6] that considerable quantities of nitrogen may be retained in the organism associated with but slight gain in weight or even with a loss in weight. The proteid gain in weight in such a case is balanced by a loss of fat tissue. Until these facts were appreciated great importance was attached to variations in weight during an observation and many valueless conclusions resulted. Any gain in weight associated with nitrogen retention was ascribed to the formation of new tissue. Table 9 furnishes some interesting information. It will be seen that there was a gradual gain in weight during three and one-half months from 5490 grams to 7220 grams. During this period on several occasions there occurred marked daily variations in weight. These sudden changes could not always be explained by the quantity or character of the food nor by the condition of the digestion. A probable explanation is that variations in the contents of the bladder and intestines caused it.

After the first metabolism observation in October, a night feeding was omitted, and the weight fell; but later, when the night feeding was resumed and in addition the twenty-four hour quantity of food was in-

4. M. Rubner u. O. Heubner: Die natürlichen ernährung eines Säuglings. Zeits. f. Biologie, vol. xxxvi, 1898. Die Künstliche Ernährung eines normal u. ein Atrophischen Säuglings Zeits. f. Biologie, vol. xxxviii, 1899.

5. W. Freund: Chlor und Stickstoff im Säuglingsorganismus. Jahr. f. Kinderheilkunde, vol. xlviii, 1898.

6. The following list comprises other important articles which I have consulted:

O. Huebner: Gatrachtungen u. Stoff und Kraftwechsel der Säuglings, etc. Berl. klin. Wochft., 1899.

W. Camerer: Der Stoffwechsel des Kindes, 1896.

A. Wassermann: Ueber Biologische Mehrleistung des organismus bei der Künstlichen Ernährung von Säuglingen, etc. Deuts. med. Wochft., vol. xxix, 1903.

Tsuboi: Ueber Stickstoffausscheidung aus dem Darm. Zeits. f. Biologie, vol. xxxv, 1897.

TABLE 9.—WEIGHT AND FOOD CHART OF INFANT.

Date.	Weight in Grams.	Quantity of Food 24 hrs.	Character of Food.	Dejections.
Oct. 4	5490	850 c.c.	Equal parts of whole milk and barley jelly, peptonised.	Always some casein lumps; oftentimes offensive odor; some mucus; average number 2 to 4 daily.
" 5	5450	920 "		
" 6	5370	1050 "		
" 7	5300	1050 "		
" 8	5260	1260 "		
" 9	5450	1260 "		
" 10	5420	1260 "		
" 11	5410	1400 "		
" 12	5520	1400 "		
" 13	5520	1400 "		
" 14	5600	1400 "		
" 15	5620	1400 "		
" 16	5680	1400 "		
" 17	. .	1400 "		
" 18	. .	1400 "		
" 19	. .	1400 "		
" 20	. .	1400 "		
" 21	. .	1400 "		
" 22	. .	1400 "		
" 23	. .	1400 "		
" 24	. .	1400 "		
" 25	. .	1400 "		
" 26	. .	1400 "		
" 27	5955	1400 "		
" 28	. .	1400 "	Metabolism observation.	
" 29	. .	1400 "		
" 30	. .	1400 "		
" 31	6135	1400 "		
Nov. 1	. .	1400 "		
" 2	. .	1400 "		
" 3	5900	1200 "		
" 4	5700	1240 "		
" 5	5680	1320 "		
" 6	5750	1320 "		
" 7	5740	1320 "		
" 8	5740	1320 "		
" 9	5710	1100 "		
" 10	5650	1540 "		
" 11	. .	1540 "		
" 12	. .	1540 "		
" 13	5825	1540 "		
" 14	. .	1540 "	Metabolism observation.	
" 15	. .	1540 "		
" 16	. .	1540 "		
" 17	6120	1540 "		
" 18	5950	1540 "		
" 19	5740	1540 "		
" 20	5710	1540 "		
" 21	5670	1540 "		
" 22	5890	1540 "		
" 23	5820	1540 "		
" 24	5900	1540 "	Whole milk ¾. Barley jelly ¼.	
" 25	. .	1540 "		
" 26	5870	1540 "		
" 27	5950	1540 "	Pepsin omitted.	
" 28	6030	1540 "		
" 29	5760	1540 "		
" 30	5820	1540 "		
Dec. 1	5750	1540 "		
" 2	5980	1540 "		
" 3	6130	1540 "		
" 4	6130	1540 "		
" 5	6260	1540 "		
" 6	6210	1540 "		
" 7	6370	1540 "		
" 8	6370	1540 "		
" 9	. .	1540 "		
" 10	. .	1540 "		
" 11	. .	1540 "		
" 12	. .	1540 "		
" 13	. .	1540 "		
" 14	. .	1540 "		
" 15	. .	1540 "		
" 16	. .	1540 "		
" 17	. .	1540 "		
" 18	6185	1540 "	Did not take food well for several days preceding this weight.	
" 19	. .	1540 "		
" 20	. .	1540 "		
" 21	. .	1540 "		
" 22	. .	1540 "		
" 23	6495	1540 "		
" 24	6430	1540 "		
" 25	6390	1540 "		
" 26	6410	1540 "		
" 27	6350	1540 "		
" 28	6440	1540 "		
" 29	6360	1540 "		
" 30	6370	1540 "		
" 31	6510	1540 "		
Jan. 1	6370	1540 "		
" 2	6590	1540 "		
" 3	6540	1540 "		
" 4	6610	1540 "		
" 5	6630	1540 "	Broth and beef juice; and bread added to his diet.	4 to 7 dejections daily; same character viz; offensive and contained mucus.
" 6	6730	1540 "		
" 7	6820	1540 "		
" 8	6700	1540 "		
" 9	6910	1540 "		
" 10	6890	1540 "		
" 11	7020	1540 "		
" 12	6940	1540 "		
" 13	7110	1540 "		
" 14	7110	1540 "		
" 15	7050	1540 "		
" 16	7110	1540 "		
" 17	7190	1540 "		
" 18	7060	1540 "		
" 19	7230	1540 "		
" 20	7150	1540 "		
" 21	7280	1540 "		
" 22	7220	1540 "		

creased, the weight remained practically the same as during the first observation. The day following the second observation in November, the infant lost 170 grams, although the food remained unchanged. This illustrates what has been said about the valuelessness of conclusions drawn from partial metabolism observations. In all probability the marked apparent gain in weight during each observation was due to something besides the formation of new tissue and fat. Following the second observation the weight remained about the same for two weeks, although the food was strengthened. During the last month additions were made to the diet, namely beef juice, broth and bread, and the gain in weight, whether due to this or not, was steadier and more rapid than at any time previous.

UNWARRANTABLE CONCLUSIONS.

In this connection I wish to add a few words about the tendency to draw conclusions based on uncertain evidence. This is especially evident in metabolism work. It would seem as if the obscurity of the whole subject would restrain any impulse to express one's self positively about causes and results, but to judge from the writings on the subject, it would appear to inspire confidence and an inclination to formulate laws. As has been pointed out, there are many possible sources of error in the work, some of which can not be avoided. In addition to this, the number of observations on infants is limited. The power of absorption and of utilization of the food must vary in different atrophic infants, depending in part on the degree of disturbance present, and especially on the character of the food. It is reasonable to suppose that it varies at different periods in the same infant. Furthermore, with the exception of Rubner's investigations, all the metabolism observations on infants are incomplete, that is, they consist solely of determinations of the fat and nitrogen absorption and excretion. A formation or destruction of tissue can not be determined from such observations. Metabolism observations, however, more especially the complete ones, have established a number of important facts connected with the metabolism of infantile atrophy. They have shown a diminished power of absorption by the intestines for cow's milk and other artificial foods, but they do not explain the cause of this failure to absorb. They also have shown that a greater expenditure of energy is required to metabolize these artificial foods than is required to metabolize human breast milk. Furthermore, enough has been done in this direction to show that the cause or causes of infantile atrophy can not be discovered by metabolism investigations. This must be left to other lines of research.

This work was done in the Pharmacological Laboratory of the Massachusetts General Hospital in 1902-3 and 1903-4. I wish to thank Dr. Franz Pfaff, director of the laboratory, and his assistant, Dr. Vejux-Tyrode, for valuable advice and assistance. I am especially indebted to Mr. F. H. McCrudden for careful instruction in the methods which are employed in metabolism work.

Radium of Little Use in Skin Diseases.—Danlos concludes from his personal observations (*Bull. et Memoires de la Soc. Med. das Hôpitaux*) that there are only three skin disorders in which radium has a real value—tuberculous lupus, pearly epithelioma and vascular nevus. Even in these its therapeutic value is a limited one. We have other older and more effective remedies, the *x*-ray for example. We may admit for it some advantages for use in the larynx and nasal fossæ, especially if its cost is reduced.

THE PATHOLOGIC EFFECTS OF ALCOHOL ON RABBITS.

AN EXPERIMENTAL STUDY.*

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VARIETY OF ALCOHOL USED AND METHOD OF FEEDING THE ANIMALS.

One hundred and twenty rabbits were utilized in the experiments with alcohol. Most of these animals were fed on absolute alcohol diluted; some on an inferior form of whisky known as "Calumet," 70, proof 33.6 per cent. In order to be certain of the exact dosage, the alcohol and whisky were introduced into the stomach through a catheter. The catheter is easily introduced into the stomach of a rabbit; the animal is placed flat on its back and strapped to an animal board; the ears are then firmly grasped, the mouth opened by means of a large forceps and the tube forced into the stomach. By means of a funnel attached to the end of the catheter, the liquid quickly enters the stomach; with practice the introduction of the tube becomes a matter of great ease and one need not fear in any way injuring the esophagus or entering the trachea and thus producing an aspiration pneumonia. After the practice of a month all complications were avoided and in none of the autopsies could any injury be discovered in the esophagus or was there any evidence of an aspiration pneumonia.

TIME TAKEN TO PRODUCE INTOXICATION AND RECOVERY.

In from 5 to 15 minutes after feeding, the animal shows signs of intoxication, the movements become sluggish and unsteady and when urged on he is unable to move. This intoxication passes on into a complete stupor from which the animal cannot be aroused. It awakens in from 3 to 5 hours and appears well on the following day. From an average drawn from all the histories, it can be stated that intoxication begins 14 minutes after feeding, complete intoxication 32 minutes after feeding, and that the intoxication disappears in 3 hours and 5 minutes from the time of feeding. These conditions vary much with the dosage, weight of the animals and apparently individual peculiarities (species). In general it can be stated that the quicker the intoxication comes on the more rapidly does the influence of the alcohol pass off.

QUANTITY OF ALCOHOL ADMINISTERED.

The quantity of alcohol taken by the rabbits varied very much according to the size and strength of the animal, and according to the duration of its life. On account of a sudden loss of weight or apparent illness the doses at times had to be discontinued for days until the animal was again in a normal condition. The daily doses varied between 5 and 8 c.c. of absolute alcohol diluted in from 15 to 30 c.c. of water, or 10 to 20 c.c. of whisky diluted in 10 or 20 c.c. of water. The average of the weekly doses in various rabbits varied very much; thus, while one rabbit consumed a weekly average dose of 40 c.c. of absolute alcohol, another consumed 48 c.c.; and, again, while another rabbit consumed a weekly average dose of 96 c.c. of whisky, another consumed 110 c.c.

The smallest weekly dose of alcohol taken was 20 c.c., the largest 50 c.c.; the smallest weekly dose of whisky 94 c.c., the largest 136 c.c. Of greater interest is the total quantity of alcohol and whisky taken by the animals. The animal that lived longest consumed over 10 liters of absolute alcohol, another rabbit consumed 7.5 liters, while another consumed over 18 liters of whisky.

VARIATIONS IN WEIGHT.

Most animals gain in weight for a time at first; the weight then remains stationary and there is a rapid fall in weight when the animal is about to die. Rapid emaciation always signifies approaching death. When there is a loss in weight during the first month one can predict an early death. The daily variations in weight during the first month show an average gain of from 5 to 8 grams; during the second month from 10 to 20 grams; during the remaining months there is practically a stationary weight, and during the last month a marked fall averaging from 10 to 20 grams.

The monthly variations in weight taken as an average from all animals was 12.5 grams.

VARIATIONS IN TEMPERATURE.

The temperature falls from 0.1 to 0.5 degrees when the intoxication begins and from 1 to 1.5 degrees when complete intoxication sets in; then gradually rises and is normal the next day.

From the average of all the rabbits the normal temperature is 104 F.; the average temperature at the beginning of intoxication, 103.8; in complete intoxication, 102.9; when the temperature falls below 102 F. the animal dies from the immediate effect of the alcohol without regaining consciousness.

BLOOD EXAMINATIONS.

A large number of blood examinations were made; these examinations consisted in the counting of the number of red and white blood cells by means of the Zeiss-Thoma apparatus; estimation of the hemoglobin by means of the Fleischel apparatus; also staining dried spreads with Ehrlich's triple stain. It was found that while the number of red and white cells are not diminished in any case except when the animal was about to die the percentage of hemoglobin sinks rapidly after the first week and gradually runs to half its normal.

The number of red blood corpuscles in a normal rabbit varies between five and six millions in a c.mm. The number of leucocytes varies between 5,800 and 14,000, the average being 10,000. This average was found to be maintained under the influence of alcohol until the last month of feeding, when the red cells fell as low as two million and the white cells as low as 5,100. The percentage of hemoglobin in the normal rabbit before feeding varies between 80 and 90 per cent. during the first month of feeding with alcohol the average fall is to 75 per cent., during the middle month of feeding 62 per cent., and during the last month of feeding 45 per cent.

The blood spreads show in the rabbit under normal conditions the following relations: Small lymphocytes, 45 per cent.; large mononuclear, 15 per cent.; eosinophiles, 32 per cent.; undetermined, 8 per cent.

This relation is pretty nearly maintained during the feeding of the animal with alcohol except during the last month of its life, when the following percentage is found: Small lymphocytes, 48 per cent.; large mononuclear, 10 per cent.; eosinophiles, 40 per cent.; undetermined, 2 per cent.

The eosinophiles, which to a great degree represent

* From the Pathological Laboratory of the Johns Hopkins University and Hospital.

the polymorphonuclear cells in the human being, being largely increased in number.

EFFECT OF ALCOHOL ON THE GASTRIC CONTENTS.

The gastric contents were examined in a large proportion of animals; free hydrochloric acid, which was present at first, gradually became lessened in quantity and often disappeared. At the beginning of feeding with alcohol the average percentage of free hydrochloric acid equaled 0.345 per cent.; this was frequently lessened in the course of one month to 0.213 per cent., and in the course of two months to .003 per cent.

EFFECT OF ALCOHOL ON THE URINE.

The urine was frequently examined in a certain number of animals. At the beginning of treatment, neither albumin nor casts could be found in any urine. Of the specimens of urine examined in 21 animals, 7 showed constantly marked traces of albumin after two months' treatment with alcohol and two slight traces, while casts were found in 5 instances. Specimens of urine from 3 other animals showed occasional traces of albumin. Of the 5 cases in which albumin and casts were found, kidney lesions were detected after death, as will be shown in the pathologic report. It must be stated, however, that notwithstanding the absence of albumin and casts in certain other cases, changes in the kidneys were detected at the autopsy.

EFFECT OF ALCOHOL ON FEMALE RABBITS.

There can be no question but that alcohol has a marked tendency to produce abortion in rabbits. In a series of 38 pregnant rabbits, 20 died of septicemia due to abortion. The organism of rabbit septicemia was found in all cases. The animals had been entirely isolated from each other. Of the remainder, 9 had constant abortions, none of the young being born at full term. Three had their young normally, but these all died in a few days after birth.

EFFECT OF ALCOHOL ON DURATION OF LIFE.

While the tolerance of any given animal could not be positively foretold, young rabbits, pregnant females, and those weighing under one thousand grams were the most susceptible. Certain rabbits were found to be so resistant that they seemed capable of tolerating daily intoxicating doses of alcohol for an indefinite period. Thus, one rabbit was given alcohol for over four years; others were fed with alcohol for three and a half and for three years. These animals had the best of care and were kept under excellent sanitary conditions. On the other hand, some of the rabbits died from acute intoxication after a few doses, and the majority succumbed after shorter or longer periods of time, with gradual loss of weight and exhaustion. If especial care was taken to lessen or to intermit the dose of alcohol when the animal began to lose weight, it was found possible later to increase the dose and to keep a considerable number of the rabbits alive for an indefinite period.

CAUSES OF DEATH AND PATHOLOGIC LESIONS.

The causes of death in the animals varied; many died during the first days or months of feeding of acute intoxication, others died in convulsions, still others of progressive emaciation or septicemia, while one animal died directly from dropsy due to a marked cirrhosis of the liver.

Complete autopsies were made on all animals; specimens were taken from all organs and hardened in absolute alcohol, Müller's fluid and Zenker's solution, and side by side with each specimen were placed the specimens from a normal rabbit; so that a comparison of sections after cutting could easily be made.

In order to simplify the work, the lesions found in the various organs will be taken up separately.

Heart.—The heart muscle showed in the great proportion of those rabbits which died a marked degree of fatty infiltration which was absent in the rabbits which were killed after cessation of the use of alcohol, showing that the fatty degeneration is not a permanent condition even though it be produced by the action of the alcohol.

This fat was diffuse and finely granular. As is well known, rabbits are apt to develop fatty degeneration of the heart muscle when kept in captivity; but it was found that rabbits fed on alcohol develop this condition of the heart much more markedly than the control animals not fed on alcohol. In order to settle this matter more definitely, 10 rabbits were kept in the open air; five of these were fed on alcohol; in 4 of the 5, marked fatty degeneration of the heart muscle developed in from two to three months, while the heart muscles of those not fed on alcohol remained perfectly normal. There can be no question but that in most animals fed on alcohol, fatty degeneration of the heart muscle is often a very frequent early manifestation. After the third or fourth month of feeding with alcohol, a sclerotic or atheromatous patch was now and then found on the inner surface of the aorta or of other blood vessels. The aorta showed here and there small yellowish areas which on microscopic examination revealed a connective tissue thickening in the subendothelial layer of the vessel. The muscular coat showed occasionally a rather marked fatty degeneration as indicated by a deposit of fatty granules in this layer. The same changes were occasionally found in the smaller vessels, though not usually, so marked. These lesions were present, however, too inconstantly to be attributed with any certainty to the action of alcohol, especially as similar lesions are occasionally found in animals which have not received alcohol.

Liver.—The liver, in a few instances, showed a rather coarse lobular aspect; the edge showing a notched appearance as if notched along the interlobular lines. On microscopic examination there appeared in these instances a marked deposition of fine and coarse oil drops in the liver cells; quite diffuse and abundant; bands of connective tissue were found running along the interlobular lines, containing occasionally an increase in lymphoid cells. These bands were richly infiltrated with fine molecular fat. Similar fine fatty granules were in the hepatic cells, especially along their borders, apparently in the capillary walls. There were some oval pigmented cells at times in the bands of interlobular tissue; there was present occasionally a monolobular cirrhosis. Necrosis of the liver cells occasionally occurred, either singly or in groups. At times the blood vessels were found thickened in their tunica adventitia. In many instances, the liver was perfectly normal; in four instances, the liver was found somewhat cirrhotic, and in one instance markedly so, abdominal dropsy accompanying the cirrhosis.

Genuine cirrhosis has not been satisfactorily reproduced in the experiments which lends support, as Welch points out, to the opinion held by many that in human beings alcohol acts only indirectly in leading to cirrhosis of the liver, or that special predisposing or associated

SYNOPSIS OF RABBIT EXPERIMENTS.

No.	A—Adult. Y—Young.	Date of Beginning of Experiments.	Wt. at Beginning in Grams.	Quantity of Alcohol Fed Per Diem in C.C.	Total Quantity of Alcohol Consumed in C. C.	Date of Death.	Wt. at Death in Grams.	Clinical Cause of Death.	Principal Lesions Formed at Death.
1	A	12/7/1893	1510	5-8 abso. alcohol	225 abso. alcohol	1/30/1894	1480	Convulsions	Fatty heart, kidneys and liver.
2	A	12/7/1893	1720	5-8 abso. alcohol	364 abso. alcohol	3/4/1894	1705	Convulsions	Fatty heart, kidneys and liver.
3	A	12/7/1893	1635	5-8 abso. alcohol	372 abso. alcohol	3/8/1894	1516	Progressive emaciation	Fatty heart, kidneys and liver.
4	Y	12/14/1893	982	5-8 abso. alcohol	40 abso. alcohol	12/30/1893	825	Acute intoxication	Fatty heart, kidneys and liver.
5	A	12/14/1893	2390	5-8 abso. alcohol	105 abso. alcohol	1/13/1898	2380	Killed	Liver cirrhotic; kidneys fatty.
6	A	12/19/1893	1450	5-8 abso. alcohol	2392 abso. alcohol	12/20/1894	1420	Convulsions	Fatty heart, kidneys and liver.
7	A	12/25/1893	1840	10-20 whisky	3852 whisky	10/20/1894	1832	Convulsions	Fatty heart, kidneys and liver.
8	A	12/26/1893	2510	10-20 whisky	1878 whisky	5/4/1894	2410	Emaciation	Fatty heart, kidneys and liver.
9	A	12/29/1893	1780	10-20 whisky	2021 whisky	5/18/1894	1535	Progressive emaciation	Fatty heart, kidneys and liver.
10	A	12/30/1893	1920	5-8 abso. alcohol	1689 abso. alcohol	10/27/1894	2500	Ascites	Cirrhotic liver, kidneys and liver.
11	A	2/16/1894	1830	3 abso. alcohol	692 abso. alcohol	10/16/1894	1810	Convulsions	Fatty heart, kidneys and liver.
12	Y	2/16/1894	850	5 abso. alcohol	5 abso. alcohol	2/16/1894	840	Acute intoxication	Fatty heart, kidneys and liver.
13	Y	3/20/1894	875	5-8 abso. alcohol	360 abso. alcohol	5/21/1894	755	Progressive emaciation	Fatty heart (extreme), kidneys and liver.
14	Y	3/20/1894	910	5-8 abso. alcohol	290 abso. alcohol	5/11/1894	830	Progressive emaciation	Fatty heart, echinococcus cysts of entire lobe of liver.
15	A	4/12/1894	1695	5-8 abso. alcohol	2310 abso. alcohol	4/27/1895	1520	Abortion septicemia	Fatty degeneration of heart and liver.
16	A	4/12/1894	2520	5-8 abso. alcohol	7884 abso. alcohol	1/13/1898	2513	Killed	Fatty liver, but heart not fatty.
17	Y	4/12/1894	875	5-8 abso. alcohol	144 abso. alcohol	5/24/1894	850	Progressive emaciation	Fatty heart (extreme).
18	Y	4/12/1894	940	5-8 abso. alcohol	152 abso. alcohol	5/16/1894	935	Convulsions	No lesions.
19	Y	4/25/1894	960	5-8 abso. alcohol	12 abso. alcohol	4/28/1894	945	Emaciation	Fatty heart, kidneys and liver.
20	Y	5/3/1894	895	5-8 abso. alcohol	83 abso. alcohol	5/17/1894	888	Acute intoxication	No lesions.
21	Y	5/3/1894	830	5-8 abso. alcohol	106 abso. alcohol	5/21/1894	840	Accidentally killed	No lesions.
22	Y	5/3/1894	910	5-8 abso. alcohol	64 abso. alcohol	5/14/1894	890	Accidentally killed	No lesions.
23	Y	5/21/1894	914	5-8 abso. alcohol	108 abso. alcohol	6/11/1894	900	Convulsions	Fatty heart, kidneys and liver.
24	Y	5/21/1894	980	5-8 abso. alcohol	104 abso. alcohol	6/14/1894	830	Acute intoxication	Fatty heart, kidneys and liver.
25	Y	5/21/1894	897	5-8 abso. alcohol	211 abso. alcohol	6/27/1894	864	Progressive emaciation	Fatty heart, kidneys and liver.
26	A	5/26/1894	2430	10-20 whisky	10875 whisky	2/10/1897	2340	Abortion septicemia	Fatty heart, kidneys and liver; ulcer of stomach.
27	Y	5/31/1894	880	5-8 abso. alcohol	84 abso. alcohol	6/14/1894	840	Convulsions	Fatty heart, kidneys and liver.
28	Y	5/31/1884	950	5-8 abso. alcohol	88 abso. alcohol	6/20/1894	920	Progressive emaciation	Fatty heart, kidneys and liver.
29	Y	6/4/1894	927	10-20 whisky	103 whisky	6/22/1894	918	Progressive emaciation	Fatty heart, kidneys and liver.
30	A	6/4/1894	2180	10-20 whisky	14869 whisky	6/10/1897	2045	Abortion septicemia	Fatty degeneration of heart, kidneys and liver.
31	A	6/26/1894	2040	10-20 whisky	10 whisky	6/27/1894	2040	Accidentally killed	No lesions.
32	A	6/28/1894	2414	5-8 abso. alcohol	6595 abso. alcohol	6/13/1898	2420	Killed	Fatty cirrhotic liver, heart not fatty; ulcer of stomach.
33	A	6/28/1894	2540	10-20 whisky	18751 whisky	6/14/1898	2522	Killed	Liver parasites. Kidneys fatty; heart normal.
34	Y	7/5/1894	922	5-8 abso. alcohol	83 abso. alcohol	7/17/1894	894	Emaciation	Fatty heart, kidneys and liver.
35	Y	7/5/1894	884	5-8 abso. alcohol	94 abso. alcohol	7/22/1894	822	Emaciation	Fatty heart, kidneys and liver.
36	Y	7/5/1894	938	5-8 abso. alcohol	11 abso. alcohol	7/8/1894	935	Convulsions	No lesions.
37	A	7/5/1894	2520	5-8 abso. alcohol	25 abso. alcohol	1/10/1897	2510	Abortion septicemia	Fatty degeneration of heart, kidneys and liver.
38	A	7/5/1894	2180	5-8 abso. alcohol	5894 abso. alcohol	1/14/1897	2020	Abortion septicemia	Fatty degeneration of heart, kidneys and liver.
39	A	7/5/1894	1540	5-8 abso. alcohol	864 abso. alcohol	12/5/1894	1400	Convulsions	Fatty heart, kidneys and liver.
40	A	7/5/1894	2530	5-8 abso. alcohol	5120 abso. alcohol	3/20/1897	2505	Abortion septicemia	Fatty heart, kidneys and liver.
41	A	7/5/1894	1890	5-8 abso. alcohol	1032 abso. alcohol	2/4/1895	1420	Convulsions	Fatty heart, cicatrix of ulcer of stomach.
42	A	7/5/1894	1940	5-8 abso. alcohol	1171 abso. alcohol	2/10/1895	1640	Convulsions	Fatty heart.
43	A	8/5/1894	2180	5-8 abso. alcohol	2540 abso. alcohol	1/14/1898	2165	Killed	Heart not fatty; cicatrix of ulcer of stomach.
44	A	8/10/1894	2215	5-8 abso. alcohol	8554 abso. alcohol	9/12/1895	2135	Abortion septicemia	Fatty heart, liver and kidneys.
45	Y	8/14/1894	1080	10-20 whisky	2189 whisky	2/5/1895	916	Progressive emaciation	Fatty heart, liver and kidneys.
46	A	8/14/1894	2520	10-20 whisky	12510 whisky	3/3/1897	2505	Convulsions	Fatty heart, liver and kidneys.
47	Y	8/14/1894	935	5-8 abso. alcohol	28 abso. alcohol	7/20/1894	920	Convulsions	Fatty heart, liver and kidneys.
48	Y	8/16/1894	845	5-8 abso. alcohol	72 abso. alcohol	7/29/1894	835	Progressive emaciation	Fatty heart, liver and kidneys.
49	A	8/16/1894	2120	5-8 abso. alcohol	6874 abso. alcohol	1/14/1898	2159	Killed	Liver slightly cirrhotic; kidneys fatty; heart normal.
50	A	8/20/1894	1742	5-8 abso. alcohol	2193 abso. alcohol	7/5/1895	1729	Abortion septicemia	Fatty heart, liver, kidneys; cicatrix of ulcer of stomach.
51	A	8/20/1894	1964	10-20 whisky	7483 whisky	4/10/1896	1922	Convulsions	Fatty heart, liver and kidneys.
52	Y	8/20/1894	2520	10-20 whisky	3842 whisky	5/21/1895	2501	Progressive emaciation	No lesions except very slight fatty heart.
53	A	8/24/1894	875	5-8 abso. alcohol	10 abso. alcohol	8/27/1894	875	Acute intoxication	No lesions found.
54	A	8/25/1894	2194	5-8 abso. alcohol	1029 abso. alcohol	3/5/1895	2189	Abortion septicemia	Fatty heart and kidneys.
55	A	8/26/1894	1872	5-8 abso. alcohol	7182 abso. alcohol	1/14/1898	1885	Killed	No lesions.
56	Y	8/26/1894	927	10-20 whisky	65 whisky	9/2/1894	904	Progressive emaciation	Fatty heart, liver and kidneys.
57	Y	8/27/1894	981	5-8 abso. alcohol	725 abso. alcohol	1/10/1895	927	Progressive emaciation	Fatty heart and kidneys.
58	Y	8/27/1894	864	5-8 abso. alcohol	5 abso. alcohol	8/27/1894	862	Convulsions	No lesions.
59	A	8/28/1894	2080	5-8 abso. alcohol	4974 abso. alcohol	1/10/1897	2088	Abortion septicemia	Fatty heart, kidneys and liver.
60	A	8/28/1894	1945	10-20 whisky	8241 whisky	9/14/1896	9540	Convulsions	No lesions.
61	A	8/29/1894	1872	10-20 whisky	18154 whisky	1/14/1898	1891	Killed	No lesions.
62	Y	9/1/1894	945	5-8 abso. alcohol	824 abso. alcohol	2/2/1895	921	Progressive emaciation	Fatty heart, kidney and liver.
63	A	9/2/1894	2478	5-8 abso. alcohol	2127 abso. alcohol	10/10/1896	2162	Abortion septicemia	Fatty heart, kidney and liver.
64	A	9/5/1894	2048	5-8 abso. alcohol	2254 abso. alcohol	11/5/1895	2032	Acute intoxication	No lesions found.
65	Y	9/8/1894	874	5-8 abso. alcohol	10 abso. alcohol	9/11/1894	862	Convulsions	No lesions found.
66	Y	9/8/1894	827	5-8 abso. alcohol	710 abso. alcohol	12/30/1894	816	Convulsions	Fatty heart, liver and kidneys.
67	Y	9/10/1894	952	5-8 abso. alcohol	782 abso. alcohol	1/5/1895	924	Progressive emaciation	Fatty heart, liver and kidneys.
68	A	9/20/1894	1679	5-8 abso. alcohol	6875 abso. alcohol	12/10/1897	1652	Progressive emaciation	Fatty heart, liver and kidneys.
69	A	9/20/1894	1846	5-8 abso. alcohol	3420 abso. alcohol	3/3/1896	1837	Convulsions	No lesions.
70	A	9/20/1894	2092	5-8 abso. alcohol	4810 abso. alcohol	12/21/1896	2046	Abortion septicemia	Fatty heart and kidneys.
71	A	9/21/1894	1872	10-20 whisky	2248 whisky	3/13/1895	1862	No cause	No lesions.
72	Y	9/24/1894	1004	10-20 whisky	1241 whisky	1/7/1895	956	Progressive emaciation	Fatty heart; cicatrix of ulcer of stomach.
73	A	9/25/1894	1827	10-20 whisky	16824 whisky	11/4/1897	1803	Abortion septicemia	Fatty heart and kidneys.
74	A	9/25/1894	1894	5-8 abso. alcohol	52 abso. alcohol	10/5/1894	1802	Progressive emaciation	Fatty heart and kidneys.
75	Y	9/27/1894	742	5-8 abso. alcohol	10 abso. alcohol	9/29/1894	736	No cause	No lesions.
76	Y	9/29/1894	854	5-8 abso. alcohol	572 abso. alcohol	1/8/1895	839	Convulsions	No lesions.
77	A	9/29/1894	1874	5-8 abso. alcohol	5027 abso. alcohol	6/12/1897	1865	Convulsions	No lesions.
78	A	10/2/1894	2122	5-8 abso. alcohol	678 abso. alcohol	2/4/1895	2110	Abortion septicemia	No lesions.
79	A	10/3/1894	2389	10-20 whisky	6540 whisky	5/5/1896	2354	Acute intoxication	Fatty heart, kidneys and liver.
80	A	10/5/1894	2542	10-20 whisky	1625 whisky	2/10/1895	2536	Convulsions	No lesions.
81	A	11/12/1894	2224	5-8 abso. alcohol	897 abso. alcohol	4/18/1896	2213	Abortion septicemia	No lesions.
82	A	11/12/1894	1652	5-8 abso. alcohol	4328 abso. alcohol	12/5/1896	1644	Acute intoxication	Fatty heart, liver and kidneys.
83	A	11/12/1894	1984	5-8 abso. alcohol	2557 abso. alcohol	12/10/1895	1961	No cause	No lesions.
84	A	11/12/1894	2124	5-8 abso. alcohol	1285 abso. alcohol	7/2/1895	2112	Acute intoxication	No lesions.
85	A	11/14/1894	1729	5-8 abso. alcohol	1924 abso. alcohol	10/22/1895	1704	Convulsions	Fatty heart, kidneys and liver.
86	A	11/14/1894	1684	5-8 abso. alcohol	3688 abso. alcohol	8/18/1896	1652	Abortion septicemia	Fatty heart and kidneys.
87	Y	11/20/1894	752	10-20 whisky	10 whisky	11/22/1894	720	No cause	No lesions.
88	A	11/20/1894	2127	10-20 whisky	1224 whisky	5/11/1897	2116	Acute intoxication	Fatty heart.
89	A	11/21/1894	2432	10-20 whisky	8420 whisky	9/2/1896	2416	Abortion septicemia	Fatty heart, kidneys and liver.
90	A	11/21/1894	1780	5-8 abso. alcohol	5572 abso. alcohol	10/4/1897	1742	Convulsions	No lssions.
91	Y	12/5/1894	725	5-8 abso. alcohol	5 abso. alcohol	12/6/1894	720	No cause	No lesions.
92	Y	12/12/1894	842	5-8 abso. alcohol	1854 abso. alcohol	9/4/1895	821	Acute intoxication	Fatty heart, kidneys and liver.
93	A	12/12/1894	2196	5-8 abso. alcohol	5155 abso. alcohol	3/10/1897	2115	Progressive emaciation	Fatty heart, kidneys and liver.
94	A	12/20/1894	1853	5-8 abso. alcohol	5682 abso. alcohol	7/3/1897	1824	Abortion septicemia	Fatty heart and kidneys.
95	A	12/22/1894	2046	5-8 abso. alcohol	6857 abso. alcohol	1/14/1898	2058	Killed	No lesions.
96	A	12/30/1894	1736	10-20 whisky	840 whisky	3/5/1895	1716	Progressive emaciation	Fatty heart, kidneys and liver.
97	A	12/30/1894	1886	10-20 whisky	9810 whisky	2/16/1897	1868	Convulsions	Fatty heart, kidneys and liver.
98	A	1/3/1895	1957	5-8 abso. alcohol	7086 abso. alcohol	1/14/1898	1964	Killed	Fatty and cirrhotic liver; fatty kidneys.
99	A	1/5/1895	2175	5-8 abso. alcohol	2983 abso. alcohol	8/19/1896	2155	Convulsions	Fatty heart, liver and kidneys.
100	Y	1/5/1895	891	5-8 abso. alcohol	3848 abso. alcohol	5/10/1897	885	Convulsions	No lesions.
101	A	1/5/1895	2532	5-8 abso. alcohol	4335 abso. alcohol	6/27/1897	2528	Acute intoxication	Fatty heart, kidneys and liver.
102	A	1/5/1895	2329	10-20 whisky	8537 whisky	11/24/1896	2320	Convulsions	No lesions.
103	A	1/10/1895	2047	10-20 whisky	12840 whisky	1/18/1897	2024	Abortion septicemia	Fatty heart, kidneys and liver.
104	A	1/10/1895	1922	10-20 whisky	15590 whisky	1/14/1898	1916	Killed	Heart not fatty, cirrhotic liver (slightly).

SYNOPSIS OF RABBIT EXPERIMENTS—CONTINUED.

No.	Adult. A—Young. Y	Date of Beginning of Experiments.	Wt. at Beginning in Grams.	Quantity of Alcohol Fed Per Diem in C.C.	Total Quantity of Alcohol Consumed in C.C.	Date of Death.	Wt. at Death in Grams.	Clinical Cause of Death.	Principal Lesions Formed at Death.
105	A	1/10/1895	2040	5-8 abso. alcohol	4154 abso. alcohol	4/15/1897	2032	Acute intoxication. . .	Fatty heart, liver and kidneys.
106	Y	1/14/1895	814	10-20 whisky. . .	225 whisky . . .	2/4/1895	789	Progressive emaciation	Fatty heart, liver and kidneys.
107	Y	1/14/1895	773	10-20 whisky. . .	2086 whisky . .	7/15/1895	725	Progressive emaciation	Fatty heart, liver and kidneys.
108	A	1/14/1895	2362	5-8 abso. alcohol	6740 abso. alcohol	1/4/1898	2355	Killed.	No lesions.
109	A	1/21/1895	2374	5-8 abso. alcohol	4082 abso. alcohol	1/2/1897	2326	Acute intoxication. . .	No lesions
110	A	1/21/1895	1986	5-8 abso. alcohol	3752 abso. alcohol	12/11/1897	1965	Acute intoxication. . .	Fatty heart, liver and kidneys.
111	A	2/3/1895	2545	5-8 abso. alcohol	3016 abso. alcohol	10/13/1896	2527	Abortion septicemia . .	Fatty heart, liver and kidneys.
112	A	2/3/1895	2055	10-20 whisky. .	14925 abso. alcohol	1/15/1898	2034	Convulsions.	Fatty heart, liver and kidneys.
113	A	3/4/1895	1896	5-8 abso. alcohol	5517 abso. alcohol	1/14/1898	1872	Killed.	Heart not fatty; kidneys fatty.
114	A	3/4/1895	1931	5-8 abso. alcohol	2029 abso. alcohol	7/5/1896	1924	Acute intoxication. . .	No lesion.
115	A	3/4/1895	2043	5-8 abso. alcohol	2873 abso. alcohol	12/20/1896	2031	Convulsions.	Fatty heart, liver and kidneys.
116	A	3/8/1895	1832	5-8 abso. alcohol	5124 abso. alcohol	1/14/1898	1818	Killed.	Heart not fatty.
117	A	5/7/1895	2322	5-8 abso. alcohol	3848 abso. alcohol	7/5/1897	2328	Convulsions.	No lesions.
118	A	5/15/1895	2245	5-8 abso. alcohol	2365 abso. alcohol	8/14/1896	2202	Progressive emaciation	Fatty heart, liver and kidneys.
119	A	6/4/1895	1794	5-8 abso. alcohol	4752 abso. alcohol	1/14/1898	1782	Killed.	Heart not fatty; kidneys fatty.
120	A	7/20/1895	1856	5-8 abso. alcohol	5 abso. alcohol	7/4/1895	1852	Acute intoxication. . .	No lesions.

conditions must be present in addition to the action of the alcohol. This failure to produce cirrhosis of the liver experimentally by the use of alcohol can not be attributed in our series to the too short duration of the experiments.

Lungs.—The lungs showed nothing important; frequently in the act of dying edema set in.

Kidneys.—The kidneys showed, as a rule, fine fatty degeneration of the epithelium in the tubules of the boundary zone of the pyramids; also a small amount of deposit in the cortical tubules. Here and there the arteries of the kidneys stood out prominently and on section were found thickened in the tunica adventitia; in a few cases the changes in the glomeruli were marked, a considerable number of these having undergone atrophy. In the five instances in which albumin and casts were found in the urine, these changes in the kidneys were marked. A number of the rabbits showed no changes in the kidneys whatever; an actual chronic interstitial nephritis was never produced.

Stomach and Intestines.—The examination of the stomach showed a round ulcer in two animals and cicatrices of healed ulcers in four. The ulcers were sharply defined, 2 cm. and 3 cm. in diameter, with thickened edges and base—the base being defined by the muscularis. Most frequently the mucus membrane was congested and there was an increase in mucus.

In many instances, the cells of the gastric tubules were cloudy and infiltrated with fatty granules, the interglandular tissue was infiltrated with small round cells and an increase in connective tissue was occasionally observed. There was evidence that some of these alterations, especially the more profound ones, were attributable sometimes to mechanical injuries inflicted by the stomach tube. In many other instances the stomach was perfectly normal. As a rule no pathologic changes were present in the intestine.

Generative Organs.—The testicles frequently showed a diffuse fine deposition of fatty granules scattered in the epithelium of the tubes and interstitial cells. The uterus revealed nothing abnormal except in those cases in which there had been abortions and in which the rabbit had died of septicemia. The uterus, in these instances, was enlarged, and the mucus membrane much infiltrated with leucocytes; the blood vessels were engorged throughout; in every instance the organism of rabbit septicemia was recovered.

Nervous System.—The cortex of the brains of a number of the rabbits was studied by Berkley.[1] The following is taken from his work, "Pathologic Histology of the Rabbit's Cortex in Chronic Alcoholism as Seen with Nissl's Stain," and "Pathologic Histology of the Rabbit's Cortex in Chronic Alcoholism as Seen with the Silver Phospho-Molybdate Stain:"

The smallest arteries have an altogether different appearance from the control preparations. The walls of many of them are irregularly shrunken, at intervals almost botryoidal in appearance; and the nuclei of the vascular walls, while not increased in numbers, are swollen, and project considerably into the lumen of the canal. The perivascular space is larger than in the control preparations, and the hyaline membrane separating it from the cerebral substance is a little more definite than normal. On transverse section the walls of the vessel are a little thickened, the lumen narrowed, the change affecting the intima more than the media. Very few of the arteries show any very pronounced changes. Four or five miliary hemorrhages into the sheaths of small vessels were noted in the several sections, all near the pial margin. Altogether no very definite lesions could be determined in the blood-vessels. Alterations of the nuclei chiefly in the disposition, swelling, and irregularity of contour of the nucleolar chromophilic particles are found.

After all possible allowances have been made for artefacts and for physiologic variations from the normal, as well as for inequalities in the staining process, there remain a large number of cells in our alcoholic brains that are distinctly abnormal. The principal lesions in them, are a distinct diminution in size, a shrinkage of a vast majority of all the cortical cells, particularly in the outspread of the branches, certain swellings of the dendritic processes with disappearance of the gemmulæ, and roughening of the stronger processes, and to a less extent of the cell body. A careful comparison of a control preparation, and one from an alcoholic rabbit's brain, will show the following differences: The cell bodies and main processes in the normal are smoother and more even, the dendrites are broader, the gemmulæ are more even, thicker and feathery, they apparently spread out over more lateral surface, and are very regular in appearance; while in the alcoholic there is a gap here and there as if some of them had fallen off and disappeared. Indeed, the differences between the two cells may shortly be expressed in that the whole appearance of the normal cell is stouter than its pathologic fellow.

SUMMARY OF THE PATHOLOGIC CHANGES IN EXPERIMENTAL ALCOHOLISM.

Prof. Welch[2] has summarized these changes as follows:

1. Animals exhibit marked individual differences in their susceptibility to the injurious effects of the prolonged administration of intoxicating doses of alcohol. While certain individuals succumb quickly, others may be kept alive under these circumstances for at least

1. Johns Hopkins Hospital Reports, vol. vi, No. 1.

2. "Physiological Aspects of the Liquor Problem."

four years without presenting any serious anatomic lesions attributable to the alcohol. Between the extremes, there are all gradations in susceptibility, young animals and pregnant ones being generally the most susceptible.

2. The experimental reproduction in animals of certain of the more characteristic diseases of human beings, attributable to the abuse of alcohol, such as cirrhosis of the liver, chronic Bright's disease and arteriosclerosis, has not been satisfactorily attained. The most common pathologic condition noted is a fatty metamorphosis affecting especially the cells of the liver, the heart muscle, and the kidneys. This lesion soon disappears after stopping the use of the alcohol. Death or necrosis of limited groups of cells in the liver and kidneys may occur, but is inconstant. More common is an acute or chronic catarrhal gastritis, but this, too, is often absent or but slight. Changes in the central nervous system, similar to those in acute alcoholism, as well as certain additional ones, may be present in experimental chronic alcoholism. Hyperemia and small hemorrhages may occur, especially in the stomach, the kidneys and the brain. In view of considerable differences in the results reported by different experimenters, and of many still unsolved problems, additional experiments on the pathologic effects of the long-continued use of alcohol and of alcoholic drinks are needed.

3. Alcoholic intoxication increases the susceptibility of animals to many infections, and influences unfavorably the process of immunization. Pregnant rabbits repeatedly intoxicated by alcohol are likely to abort, and to die soon afterward from some accidental infection. Many of their young die a few days after birth.

In conclusion, I wish especially to thank Prof. William H. Welch, who directed this work, for his many suggestions and his encouragement in the performance of these experiments.

This work was aided by a grant from the "Committee of Fifty."

PULMONARY STREPTOTHRICOSIS.

A REPORT OF TWO CASES AND A REVIEW OF THOSE HITHERTO REPORTED FROM A CLINICAL STANDPOINT.

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PHILADELPHIA.

It is not our intention in the present paper to discuss the morphology or the classification of the streptothrix. This subject has been very ably considered in the papers of Norris and Larkin,[1] Flexner,[2] Warthin and Olney[3] and others. It may be said, however, that no definite conclusions have been reached. The consensus of opinion seems to be that there are several distinct varieties of steptothrix, and that the various cases reported as instances of streptothricosis have been due to different varieties of this micro-organism.

From a study of the thus far reported cases of pulmonary streptothricosis it seems that the majority of the cases present the clinical picture of pulmonary tuberculosis. Bronchiectasis is frequently encountered, and hemorrhage is quite a common symptom. The majority of cases ended fatally, often as the result of metastasis to different parts of the body, the central nervous system being frequently involved. We have collected only those cases of streptothricosis which showed evidences of pulmonary involvement; numerous cases are on record in which other organs were the seat of the morbid process. Thus, for example, Ucke has reported a case of tonsillitis due to the streptococcus. Of course, it is not proved that this micro-organism was primarily etiologic in all the cases here collected, although in the majority it would seem eminently probable.

The streptothrix belongs to a rather ill-defined class of vegetable micro-organisms which, while in many respects closely simulating bacteria, yet possess certain features resembling the hyphomycetes. The dividing line between the streptothrix and bacteria is hard to draw, inasmuch as some of the latter, such as the *B. diphtheriæ* and the *B. tuberculosis,* at times exhibit branching and other characteristics of the former. Flexner says that the streptothrices, like the moulds, develop from spores into "cylindrical, dichotomously-branching threads, which alternately grow into colonies, the appearance of which suggest a mass of radiating filaments (mycelia)." The streptothrix, then, stands in a class between the moulds and the bacteria.

Doubtless one reason why streptothricosis of the lung has not been reported more frequently is that it is not readily demonstrable by the carbol-fuchsin method of staining, and, therefore, unless the sputum is examined by the Weigert-Gram method the organism may be overlooked. In a number of the cases which we have collected, the sputum was examined repeatedly for tubercle bacilli by the usual carbol-fuchsin method, with negative results, and it was only when the Gram process was employed that the micro-organism was found. The obvious conclusion is, of course, that all cases of suspected tuberculosis in which the tubercle bacillus is not found should be carefully examined by the Gram process for streptothrix.

The mere presence of the streptothrix in the sputum or in the tissues does, of course, not prove it to have been the primary pathogenic factor; it may be there simply as a secondary infection; that there are cases on record, however, in which this organism played the main and probably sole rôle in the production of organic lesions, we think, has been incontestably shown. It is a well-known fact that the tubercle bacillus tends to produce different pathologic changes, which present different clinical pictures when it is associated with varying micro-organisms, and it is quite probable that similar variations occur in streptothricosis when mixed infections exist. From a study of the reported cases, it seems that in the acute, bronchopneumonic type of streptothricosis, metastasis is quite common. The skin and the brain seem to be the most frequent locations for such processes, but the bones, the peritoneum, the pericardium, the liver, the spleen, the kidney and the bladder at times have also shared in the involvement. Animal inoculations were made in several cases, and in quite a number typical, although not always fatal, lesions were produced. The tendency to metastasis was also well marked in most of the inoculated animals.

Mayer,[4] in his *"Briefe aus Ostasien,"* mentions having seen ten cases of streptothricosis of the respiratory tract.

1. Norris and Larkin: Jour. of Exp. Med., 1890.
2. Flexner: Trans. Assoc. Amer. Phys., 1898, vol. xiii.
3. Warthin and Olney: Amer. Jour. of Med. Sciences, October, 1904.
4. Mayer: Muenchner med. Wochft., 1901, p. 1775.

The organism was found in the sputum in small yellowish lumps resembling actinomycosis granules; elastic tissue blood and alveolar cells were also present. One case which came to autopsy showed encapsulated gangrenous areas in the right upper lobe of the lung, in which, as also in the pleural cavity, streptothrix could be demonstrated. These cases, occurring, as they did, after a sandstorm, suggested that infection occurred by inhalation. Another case is also mentioned in which apparently well-marked cavity formation healed completely, together with a disappearance of all symptoms.

Streptothricosis of the lung occurs in two forms: 1. The acute variety, which presents the symptoms of bronchopneumonia, with mucopurulent expectoration, yellowish or greenish in color, at times hemorrhagic or containing elastic tissue and bespeaking a necrotic process. Later in the course of the disease we may encounter purulent metastases in other parts of the body. Such have been reported in the skin by Scheele and Petruschky,[5] and in the liver, spleen, heart and brain by Engelhardt and Löhlein.[6] This form, therefore, presents in the advanced stages the clinical picture of a pyemia and seems to run to an inevitably fatal termination.

The gross pathology of the lungs resembles, to a certain extent, that of tuberculosis, with caseous areas and softening, surrounded by zones of round-cell infiltration

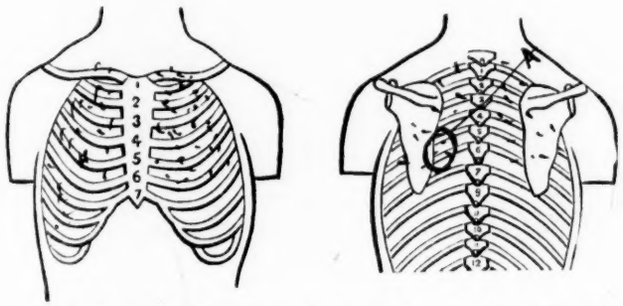

Fig. 1.—Showing râles throughout chest. A. Amphoric whispered pectoral râles.

or induration; occasionally multiple abscesses are encountered.

Microscopically, the streptothrix appears as long, fine, homogeneous, glistening threads, occurring in clumps and exhibiting a true branching, staining poorly and especially irregularly with Gram's stain, and thus, too, on superficial examination, resembling cocci (Fraenkel).[7]

2. The chronic variety, first described by Flexner[2] in 1897, presents almost an identical picture with chronic pulmonary tuberculosis. The case here reported showed in the lungs extensive areas of consolidation and necrosis, together with numerous tubercle-like bodies, the latter being also found in the peritoneal cavity.

CASE I.—W. S., mulatto, aged 22, was admitted to the Philadelphia General Hospital Sept. 7, 1904, on account of inguinal buboes of several weeks' duration, which were the sequelæ of gonorrhea. After undergoing the operations of circumcision and extirpation of the inguinal glands, the patient having a cough and signs of pulmonary apical disease, was transferred to the medical wards.

History.—Father died of unknown cause, mother of pulmonary tuberculosis. There is no history of malignancy or of syphilis. Patient had convulsions in childhood; later measles and diphtheria. He had chancroid of the penis fourteen months ago. He uses alcohol in moderation, but does not use tobacco.

Present Illness.—On admission to the medical wards, the patient complained of persistent cough, with copious fetid expectoration, and of pain in the left side and back.

Examination.—Pulse 90, respirations 35, temperature 102 F. Dyspnea was marked.

Lungs: There was marked dullness of the left chest, extending from the base up to the seventh rib. There was impairment of resonance at the left apex, anteriorly, at which area a few subcrepitant râles were heard. Posteriorly there was dullness at the left apex, with bronchovesicular expiration and great numbers of mixed râles. Over both bases, anteriorly, laterally and posteriorly, resonance and fremitus were diminished, breath sounds were feeble and distant. Posteriorly, beneath the lower third of the left scapula, there was an area of about two and one-half inches in diameter, over which amphoric respiration, aëgophony, whispered pectoriloquy and moist resonating râles were heard. The entire left chest was tender on percussion, and respiratory motion was restricted.

Heart: There was marked accentuation of the second sounds at the bases; otherwise examination was negative. Other organs showed nothing abnormal.

Urine: Urine was amber colored, acid, sp. gr., 1024. There was a trace of albumin, no glucose; there were hyaline casts and epithelial débris. It was deficient in amount.

Blood: On several different occasions, this showed a leucocytosis ranging from 9,000 to 13,600, chiefly of the polymorphonuclear variety.

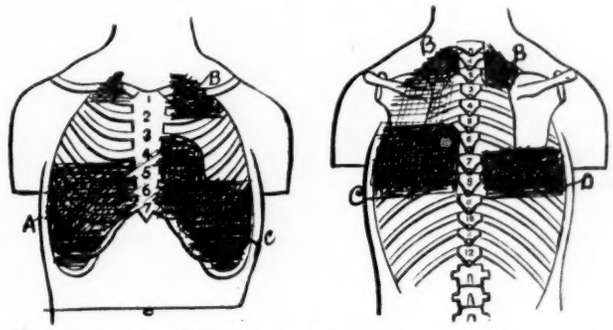

Fig. 2. Impaired resonance, vocal fremitus, and bronchovesicular expiration; C, distant breath sounds, fremitus and resonance feeble, pain, flat to percussion; D, friction sounds.

Course of the Disease.—The patient continued to lose weight and suffered from night sweats, accompanied by cough and large amounts of mucopurulent expectoration. He had several profuse pulmonary hemorrhages, and presented the clinical picture of chronic pulmonary tuberculosis.

Sputum: The sputum was examined for tubercle bacilli on sixteen different occasions, with negative results.

On January 14, Dr. Rosenberger reported the presence of streptothrix in the sputum.

March 7, the following report was received: "A great variety of bacteria. Organisms corresponding in morphology and tinctorial characters to the *B. fusiformis* of Vincent; cocci resembling pneumococci, a few streptococci, and various other unidentified species. No tubercle bacilli are demonstrable. A streptothrix is also present."

March 26, a special examination for Pfeiffer's bacillus proved negative.

March 29, the following physical signs were recorded: Clubbing of the fingers which has existed since admission has increased in degree.

Diagnosis.—Until the streptothrix was demonstrated in the sputum the diagnosis had been: "Chronic bilateral fibroid pleuritis, with infiltration and bronchiectasis (or cavity formation) of the left lung, probably tuberculous in origin."

Treatment.—This consisted mainly of stimulation with strychnin and forced feeding. Pain in the left chest was greatly relieved by strapping. Hemoptysis was treated by recumbency, ice bag to the chest, glonoin internally, etc. Santal oil was administered for a time in the hope of lessening ex-

5. Scheele and Petruschky: Deut. med. Wochft., 1897.
6. Engelhardt and Löhlein: Deut. Arch. f. klin. Med., vol. lxxv, p. 118.
7. Fraenkel: Pathologie und Therapie der Lungenkrankheiten, 1904.

pectoration and decreasing its fetid character, without any apparent result. Creosote in ascending doses was tried at another time and proved hardly more efficacious.

Diet: During the greater part of the time the patient was given the regular "house diet." In February eggnogs were given between meals, and the patient was encouraged to take as much milk as possible. Soon after beginning improvement was noted, manifesting itself by gain of weight and strength. As soon as the patient was able to be out of bed he was made advice. His temperature, pulse and respiration were still irregular and abnormally high. The nephritis, according to chemical tests, had disappeared, but the patient had never voided more than 48 ounces of urine, the average being about 35 ounces. He had gained considerably in weight and said that he felt strong enough to "work on the farm."

CASE 2.—P. T., Italian, aged 26, a laborer, was admitted to the Philadelphia General Hospital March 23, 1905, with the symptoms of left-sided pleuritis.

No.	Reported By	Age.	Sex.	Symptoms.	Occupation.	Course of Disease.	Result.	Cultures.	Inoculation.	Associated micro-organisms.	Organs Involved.	Coincident Tuberculosis.	Sputum.	Remarks.
1	Flexner[2]	70	M	Pulmonary tuberculosis.	Not stated.	.....	Death....	—	—	None.....	Lungs, peritoneum, omentum, liver, spleen.	None	None.....	
2	Eppinger[8]	52	M	Cerebrospinal meningitis.	Glass cutter.	20 days..	Death ...	+	+	None.....	Br'in, l'ngs, bronchial glands, spinal cord.	Old focus lungs	Not stated..	
3	Sabrazes & Riviere[9]	..	..	Abscess of neck, renal infarct.	Not stated.	....	Death....	+	+	None.....	Lungs, brain, kidney.	None	Not stated..	
4	Sabrazes & Riviere	..	..	Bronchopneumonia, multiple cutaneous abcesses.	Not stated.	.....	Death....	+	+	None.....	Lungs, skin...	None	Mucopurulent.	
5	Scheele & Petruschky[5]	56	F	Pleuropneumonia, pyemia.	House work.	5 mos....	Death....	—	—	None.....	Lungs, skin, kidney, bladder.	None	Mucopurulent.	First case diagnosticated intra vitam.
6	Buckholtz[11]	38	M	Tuberculous pneum'ia, empyema.	Steel moul'der.	7 weeks..	Death....	—	—	Str'cocci secondary.	Lungs, pleuræ..	None	Fetid mucopurulent.	Hemoptysis; cavity formation.
7	Petruschky[5]	12	F	Pulmonary tuberculosis.	School.	Several weeks.	Not stated.	—	—	Infl'enza B. diplo'cci.	Lungs.....	None	Mucopurulent.	Mother and sister died of tuber'losis, streptothricosis?
8	Rullmann[12]	..	F	Tub'cul'is bronchial glands.	House work.	.....	Not stated.	+	+	Diphtheria?	Lungs.....	None	Aqueous and cheesy nodules.	
9	Foulerton[13]	46	F	Chronic pulmonary tuberculosis.	House work.	2 years...	Not stated.	—	—	None.....	Lungs.....	None	Aqueous, at times hemorrhagic and "sulphur granules."	
10	Norris & Larkin[1]	45	M	Fever, cough, dyspnea.	Carpenter.	7 weeks..	Death....	+	+	Streptococci.	Lungs, bronchial glands, pleuræ.	None	Copious, fetid, mucopurulent.	Clinical diag. pulmonary gangrene, bronchiectasis.
11	Norris & Larkin[1]	23	M	Chronic pulmonary tuberculosis.	Laborer.	13 years?.	Death....	+	+	Streptococci.	Lungs, bronchial glands, pleuræ.	Yes.	Mucopurulent.	Scoliosis and 10 yrs. cough; diagnosis bronchiectasis.
12	Aoyama & Migamoto[14]	..	..	Cough, expectoration.	Not stated.	7 days...	Death....	+	+	None ...	Lungs, brain?..	None	Copious, non-fetid homogeneous, yellowish.	
13	Musser[15]	37	M	Chronic pulmonary tuberculosis.	Business man.	1 week...	Death....	—	—	Strepto- and pneumococci?	Lungs.....			
14	Birt & Leishman[16]	26	M	Empyema, pericarditis.	Soldier.	5 mos....	Death....	+	+	Hyo. micr'organisms in pericardium.	Lungs, pleuræ, pericardium, liver.	None	Reddish, mucopurulent.	
15	Warthin & Olney[3]	45	M	Pulmonary tuberculosis.	Farmer.	3 years...	Death....	0	0	None.....	Lungs.....	?	Mucopurulent, no fetor.	
16	Engalhard & Loehlein[6]	22	M	Dyspnea, cough, fever, pleuritis.	.....	3 mos....	Death....	+	+	None.....	Lungs, heart, pleuræ, peritoneum, liver, spleen, brain.	None	Mucopurulent.	
17	Von Hoke[17]	48	M	Chronic tuberculosis.	Laborer.	2 years...	Death....	*	*	Streptococci.	Lungs, pleuræ..	None	Mucopurulent.	Hemoptysis, clubbed fingers.
18	Ucke	..	..	Pulmonary abcess, empyema.	.....	.....	Improved.	—	—	None.....	Lungs, pleuræ..	None	Mucopurulent.	
19	Ucke	..	..	Pulmonary gangrene.	.....	.....	Death....	—	—	Cocci.....	Carcinoma, esophagus: rupture, bronchus	None	Fetid, mucopurulent.	
20	V. Giemssen[19]	Yu'g	F	Cough, expectoration.	House work.	Several years.	Stationary.	0	0	None.....	Lungs.....	None	Mucopurulent.	Hemoptysis round masses in sputum like actinomycosis granules.
21	Ashton & Norris	22	M	Fibroid pleuritis, bronchiectasis.	Laborer.	3 mos....	Improved.	0	0	Very numerous.	Lungs, pleuræ.	None	Mucopurulent.	Hemoptysis; clubbed fingers, mother died of pulmonary tuberculosis.
22	Ashton & Norris	26	..	Pulmonary tuberculosis.	Laborer.	6 mos....	Stationary.	0	0	None.....	Lungs, pleuræ..	None	Mucopurulent.	Hemoptysis; clubbed fingers.
23	Riviere[20]	..	..	Pulmonary tuberculosis.	.....	Not stated.	Death?...	+	+	None.....	Lungs, skin..	None	Mucopurulent.	
24	Aoyama[14]	..	M	Pulmonary tuberculosis (kakke).	.....	.....	Death?...	+	+	Tubercle	Lungs, pleuræ..	Yes.	Mucopurulent.	
25	Chiari[21]	43	..	Cerebral hemorrhage.	Brickmaker.	7 days...	Death?...	—	—	Pneumococci.	Lungs, pleuræ cerebellum, cord.	Old sc'rs?	Mucopurulent.	Bronchiectasis.
26	Ohlmacher[22]	..	..	Pulmonary tuberculosis.										

NOTE.—In cultures and inoculation columns + signifies positive; — signifies negative.

to spend the greater part of the day out of doors on the fire escape.

April 3, patient left hospital at his own request, against

History.—Parents are dead from unknown causes. Four brothers and one sister are well. There is no history of tuberculosis or of malignant disease in the family. Patient denies

8. Eppinger: Zieglers Beitraege, 1890, vol. IX.
9. Sabrazes and Riviere: La Semaine Médicale, 1895.
11. Buchholtz: Zeit. f. Hygiene u. Infectionskrankheit, 1897, vol. xxiv.
12. Rullmann: Munch. med. Wochft., 1898 and 1902.
13. Foulerton: Lancet, 1899.
14. Aoyama and Miyamoto: Centribl. f. Bakteriol., 1901.
15. Musser: Chicago Med. Rec., 1901.
16. Birt and Leishman: Jour. of Hygiene, 1902.
17. von Hoke: Prager med. Wochft., 1901.
18. Ucke: St. Petersburger med. Wochft., 1901.
19. von Ziemssen: Verhandl. d. Cong. f. innere Med., 1898.
20. Riviere: Archiv. Clin. de Bordeaux, 1895, vol. iv, p. 469.
21. Chiari: Zeits. f. Heilkunde, vol. xxi, 1900, No. 10.
22. Ohlmacher: Quoted by Warthin and Olney.

all history of preceding diseases, even in childhood; also of venereal disease and alcoholism.

Present Illness.—This began one month ago with cough, which increased as time went on and was accompanied with mucopurulent expectoration. During this time he lost weight rapidly, developed night sweats and anorexia, and had on two or three occasions attacks of hemoptysis.

Examination.—The patient is a well-developed man, fairly nourished. Pupils are normal. Moebius' sign was present in right eye. Chest is well formed. There is marked clubbing of the fingers.

Heart: There was marked accentuation of the aortic second sound; otherwise negative.

Spleen: This organ was palpable two inches below the costal margin.

Reflexes: The reflexes were apparently normal.

Lungs: There was diminished, delayed and restricted respiratory movement on the left side. Breathing was painful. The lower two-thirds of the left chest was flat on percussion, breath sounds feeble and distant, fremitus absent and resonance diminished. At the left apex, anteriorly, there was bronchovesicular expiration, fremitus and resonance were increased, and there was cog-wheel inspiration. Posteriorly, there were the same findings, with the exception of the last-named. At the right apex, anteriorly and posteriorly, there was vesiculobronchial expiration. Moist râles were heard from time to time diffusely throughout both lungs, mostly in the left.

Urine: Amber, acid, trace of glucose, no albumin, triple phosphates and amorphous urates.

March 26, 1905, pain in left side, incessant cough and copious, thin, mucopurulent expectoration remain the chief symptoms. There were irregular fever, night sweats (Figs. 1 and 2). The foregoing examination led us to believe that we had to deal with a case of pulmonary tuberculosis, with extensive involvement of the pleura. The sputum was examined for tubercle bacilli five times, with negative results. Finally a special examination by Dr. Rosenberger revealed the presence of streptothrix.

May 9, 1905, patient was more dyspneic and emaciated. Clubbing of fingers was more marked. Two urine examinations were entirely negative. Pain in the chest was relieved by strapping. Expectoration was thin, mucopurulent, sometimes almost aqueous in character and not infrequently amounted to over a quart in the course of twenty-four hours, thus pointing strongly toward the existence of a bronchiectasis. No definite physical signs pointing toward the existence or localization of such a lesion, however, could be made out, but the pleural thickening obscured the breath sounds almost entirely. Exploratory puncture of the left pleural sac yielded negative results. Despite the absence of chemical and microscopic findings in the urine indicative of nephritis, the patient persistently voided very small quantities of urine. This possibly was, in part, due to the large quantity of fluid eliminated in the sputum.

May 29, 1905, patient was in the same condition. He looked very ill, almost cachectic. He took nourishment badly and did not seem much benefited by extra diet of milk and eggs with which he was supplied. It was thought that he would, perhaps, do better if outdoor life could be instituted. To check the excessive expectoration, ascending doses of creosote were administered, without benefit, but the dosage amounted to only fifteen minims thrice daily. Further than this, treatment was stimulating—strychnin, glonoin, digitalis, caffein, etc. Temperature was still irregular.

Blood:

Erythrocytes, 3,560,000; leucocytes, 7,400. Differential count of leucocytes, as follows:

Lymphocytes	13.5 per cent.
Polymorphonuclear	77 per cent.
Hyaline forms	7 per cent.
Eosinophiles	2.5 per cent.

SUMMARY OF CASES.

The accompanying tabulation of twenty-six cases of pulmonary streptothricosis includes the hitherto reported cases, together with the two here recorded. The cases have been compared and contrasted from a clinical standpoint, the preceding articles having dealt almost exclusively with the pathologic and bacteriologic side of the question. From the study of these the following facts may be summarized:

Thirteen cases occurred in males, 5 in females, 8 no data. The youngest individual attacked was 12 years, the oldest 70. The course of the disease varied from one week to several years; the majority showed a duration of several months. Seventeen cases had the symptoms of pulmonary tuberculosis, most of these of the chronic variety. Twenty of the cases died—76 per cent.—2 improved, 2 remained stationary, 2 no data. Cultures and animal inoculations yielded positive results in 11 instances. Hemoptysis was recorded 6 times (23 per cent.) Pure streptothrix infection existed in 14, in 12 other organisms were coincidently encountered. Tuberculous lesions—old pulmonary scars—were found twice, tubercle bacilli once, scoliosis once. Various methods of treatment have been tried without definite or satisfactory results. The inhalation of medicated vapors had no effect. It would seem rational to presume that the best results would be attained by a therapy such as is employed in the various sanatoria for tuberculosis.

It will be noted that the two cases here reported present numerous features in common. Both suffered from inflammation of the pleuræ, accompanied by evidences of marked infiltration. Both expectorated very large amounts of mucopurulent matter and had irregular fever, hemoptysis and symptoms of vasomotor ataxia. Both continuously voided very small quantities of urine—often only from 14 to 16 ounces a day—without marked evidences of nephritis, despite the fact that they were imbibing large amounts of liquid diet. In their response to treatment, however, there was a marked difference in the two cases. The patient in Case 1, in whom the condition had apparently existed for a longer time, improved under treatment and left the hospital. The patient in Case 2, in whom the infection seemed more acute and virulent, became progressively worse. Despite the assertions of the patients to the contrary, we are inclined to believe that the disease had existed in both cases for a much longer period than the histories would lead us to believe; for it is hardly credible that such extensive and massive pleural thickening, even without the bronchiectasis, could take place in a short time. It is more than likely that, similarly to many cases of pulmonary tuberculosis, the incipient symptoms were of such slight and insidious nature that they were overlooked by the patient.

In closing we would like especially to emphasize our conviction that some of the many apparent cases of pulmonary tuberculosis, in which there is seemingly extensive tissue involvement, often associated with copious expectoration, in which repeated analyses of the sputum fail to reveal tubercle bacilli, if examined with the proper tinctorial agents, would reveal the presence of the streptothrix.

Improved Technic of Spinal Anesthesia.—Le Filliatre states that all the by-effects of spinal cocainization can be avoided by reducing the pressure of the cerebrospinal fluid as a preliminary. Whatever the pressure, he allows the fluid to flow until, instead of spurting, it drips slowly from the needle. He then reinjects always the same amount—10 c.c.—mixed with the anesthetic to be employed. In an illustrated communication in the *Journal de Médecine de Paris*, he announces that he has never had a mishap in a total of 452 cases in which he has followed this technic. He thinks the varying experiences of others are due to the differences in the pressure of the cerebrospinal fluid at the moment of the injection.

Special Article

IMMUNITY.

CHAPTER XXV.

CHOLERA.

In 1883 Koch recognized microscopically in the stools of cholera patients, and by proper technic obtained in pure culture, the *Vibrio choleræ*, which stands to-day as the unquestioned cause of Asiatic cholera. The organism may be cultivated from the stools in every case of cholera, and is never found in the stools of normal individuals, except in the case of non-susceptible persons who are often encountered in the presence of an epidemic. Such persons are often a source of danger as unsuspected "cholera carriers." No other intestinal disease is accompanied by the presence of the vibrio of cholera.

Characteristics of the Organism.

Typically the cholera vibrio is about 1.5 microns long and one-fourth as broad. When freshly cultivated from the stools the cells of young cultures have the so-called comma shape which has given the organism the name of the comma bacillus. The form in reality is that of a segment of a spiral. When two cells are attached end to end an S-shape is commonly produced, and long spirals are made up of many cells which are joined at the ends. Old cultures show many deviations from the typical form, the cells assuming the form of thick rods or even appearing coccus-like. The vibrio possesses a single long flagella, which is situated at an end. Although two, four and six flagellæ have been described, Kolle states that such organisms are not cholera vibrios, but vibrios of another nature. In the character and rapidity of their movement, as seen in a hanging-drop, Koch compares the organisms to a swarm of mosquitoes. Old cultures may lose their motility to a large extent. The cholera vibrio does not form spores, although certain involution forms simulate them. It stains readily with the ordinary anilin dyes and is Gram negative.

Cultivation from the Stools.

The comma bacillus grows readily in various culture media of an alkaline reaction, certain appearances being characteristic; it is an obligate aërobe under artificial conditions, in spite of the fact that it flourishes in the intestines. The optimum temperature lies between 30 and 40 C. A very simple method of obtaining the organism in pure culture from the stools was discovered by Koch. In tubes of peptone bouillon which have been inoculated with the feces of a patient, the vibrio proliferates rapidly and within a few hours exists in almost pure culture at the surface of the liquid. Isolated colonies are obtained by transferring a small amount of the surface fluid to tubes of liquefied gelatin, then plating the latter. The colonies of cholera vibrio appear in a few hours as small translucent points from which pure cultures are made on a suitable medium. For more positive identification of the organism agglutination tests are performed with an artificially prepared anticholera serum. The Royal Institute for Infectious Diseases (Berlin) keeps on hand a dried serum of known strength (1-10,000) for this purpose. Tests are made in dilutions of 1/50, 1/100, 1/1000 and 1/2000, the final dilutions being so great that coagglutinins for other vibrios are practically eliminated. To the agglutination test may be added the "Pfeiffer experiment," in which the protective power of an anticholera serum is determined when guinea-pigs are infected intraperitoneally with the suspected culture. If the serum shows a protective power against this organism which approximates that shown against a known cholera vibrio, the diagnosis of cholera is justified. In performing such experiments the serum is mixed with the culture before injection.

Identification.

Resistance.

The resistance of the cholera vibrio is very low. It dies in about two hours when dried (Koch) and on this account dust infection is thought not to occur. It is killed instantaneously by the boiling temperature, and in five minutes at 80 C. It is extremely susceptible to carbolic acid (killed by 1 per cent. in five minutes), corrosive sublimate (1 to 2,000,000 or 3,000,000 in from five to ten minutes), and to acids. Calcium chlorid is an efficient disinfectant when thoroughly mixed with the stools. The micro-organism lives in distilled water not longer than twenty-four hours, in ordinary water for several days to several weeks, and in one instance it was cultivated from the water of an aquarium after several months. Its life is short in the presence of putrefactive bacteria and rapidly-growing saprophytes, dying in sewer water in from twenty-four to thirty hours (Koch). Because of the large overgrowth of other organisms, the vibrio can rarely be cultivated from the stools of cholera patients for a longer period than from one to three days after death. Its life in and on foods depends on the reaction (alkalinity is favorable), and on the presence or absence of moisture. It lives longer in sterilized milk (ten days) than in that which contains other micro-organisms.

Infection Atrium and Dissemination.

The only infection atrium is the small intestine by way of the mouth and stomach. Infection by way of the lungs or through wounds does not take place. In the patient the living vibrio occurs only in the intestines, and it is excreted only with the feces. So far as known, it has no normal habitat outside the body, although a stream or other water supply may contain the vibrio over a long period through constant reinfection of the water. This can only occur, directly or indirectly, through the stools of patients. The washing of soiled linen or bathing in water which is used for drinking and other household purposes have caused outbreaks of cholera. The water supply of a city may be infected by the discharges of patients who are confined to a ship. Convalescents may retain virulent organisms in their stools for forty-eight days (Kolle), and, as stated, healthy persons who are insusceptible to cholera and who have resided in a cholera infected district, may carry virulent vibrios in their intestines. These conditions have contributed to the futility which to a large degree has met attempts to restrict cholera to limited districts by ordinary quarantine measures. In its extension from country to country cholera finds its way along the lines of travel. In some instances in which cholera has existed in pandemic proportions it has been possible to trace its source to the delta of the Ganges in India, a region in which the disease is endemic. Pilgrims from India have carried the infection to Mecca, and pilgrims from Egypt have carried it to their native land on their return from Mecca. Either from Egypt, or through Arabia, Asia Minor and Southern Russia or Turkey, cholera has with more or less rapidity extended to Western Europe. The development of rapid transit has increased the rapidity with which cholera may extend to distant parts. From Europe the disease has been carried to various ports of the western continent, Canada, the West Indies and southern ports of the United States, from which extension has occurred to different sections. Out of six widespread epidemics which occurred in the past hundred years, three have involved the United States, reaching considerable proportions. The means of introduction is not always apparent.

Epidemics.

As in typhoid, two types of epidemics are known, the two often being associated: First, that caused by water infection and, second, that in which the disease spreads by other means of indirect contact and by direct contact. The explosive character of an epidemic caused by infection of a water supply is much more striking than in the case of typhoid fever. In large cities hundreds, or even thousands, may be stricken within a single day. The brief incubation period, from twelve to twenty-four hours, contributes to the acuteness of the outbreak. The distribution of a "water-borne" epidemic corresponds with the distribution of the infected water. A remarkable occurrence illustrating this point was noted in the epidemic which attacked Hamburg in 1892. In certain streets in which the residents of the two sides obtained their water supply from different sources, one of which was infected, cholera was limited to that side which was supplied with infected water. Only irregular cases due to contact infection occurred on the opposite side of the street.

Epidemics which are due solely to contact infection develop slowly and irregularly. A common incident is the successive

involvement of the members of a family, whereas others in the immediate neighborhood are unaffected. Water borne epidemics are invariably complicated by the occurrence of contact infection. The methods of contact infection are not different from those mentioned under typhoid fever. Food or milk which has been infected by contaminated water or by other means may cause the development of isolated groups or cases.

Susceptibility of Animals.

So far as known, no animal undergoes spontaneous infection with cholera. By rendering the gastric contents of guinea-pigs alkaline and introducing cultures into the stomach through a tube, Koch induced a cholera-like process from which the animals died within from twenty-four to thirty-six hours; an intraperitoneal injection of opium, to quiet peristalsis, seemed to be necessary for the success of the experiment. Similar results were obtained in very young rabbits by feeding cultures to them (Issaeff and Kolle, Metchnikoff). Guinea-pigs withstand the subcutaneous inoculation of moderate amounts, but are very susceptible to intraperitoneal inoculation. Intravenous injections are exceedingly toxic for rabbits, and a fatal cholera-like condition with localization of the organisms in the intestines and intestinal mucosa has been produced in this way (Thomas).

Susceptibility of Man.

A number of cases are recorded in which investigators while working with cultures have become infected with cholera, the cases running typical courses which sometimes ended fatally (Pfeiffer, Pfuhl and others). That not all persons are equally susceptible to the disease is shown in the few instances in which infection has been attempted deliberately; some contracted the disease, at least one case ending fatally, whereas in others either a mild infection or none at all took place.

Endotoxin.

The essential poison of the cholera vibrio is intracellular, and becomes free only after solution of the bacterial cells. Cultures which are killed carefully as by chloroform vapor (Pfeiffer) are highly toxic, although the fluid alone is non-toxic. Young cultures entirely free from bacteria have little or no poisonous action. The toxicity of older bouillon filtrates is due partly to solution of the bacteria with consequent liberation of endotoxin, and perhaps also to secondary disintegration products which have a certain toxicity. The soluble toxin of Metchnikoff, Roux, and Taurelli-Salimbeni is a dissolved endotoxin and not a secretion of the living cells, according to Kolle.

Pathogenesis.

Koch considers that cholera is an acute infectious process involving the intestinal epithelium, whereas the general condition is one of acute intoxication. It is assumed that the condition in the intestines corresponds to that in the culture media, i. e., that here,too, no true soluble toxin, comparable with that of diphtheria or tetanus, is secreted, but that the toxin which eventually reaches the circulation is that which is liberated from the bacteria after the latter have been dissolved by the bacteriolysin of the plasma, or perhaps by the leucocytes. Doubtless a great deal of endotoxin is liberated in the intestinal canal, but it is Koch's conception (cited by Kolle) that the primary intoxication comes from those organisms which have penetrated between and beneath the epithelial cells and here have undergone solution. One effect of the toxin in this situation is to cause desquamation of the intestinal epithelium, as a consequence of which rapid absorption of the toxin from the intestinal canal takes place through the denuded surface. This theory supposes that the toxin is not readily absorbed through the intact epithelium. The living vibrio has never been cultivated from the blood.

The changes in the intestines depend on the duration of the infection. In cases which prove fatal within a few hours the mucosa shows only moderate general reddening, which is intensified at the borders of Peyer's patches and the solitary follicles. The intestinal contents are of a rather clear fluid nature in which are suspended flakes of mucus and epithelium; the fluid may be tinged with blood. With a longer duration of the disease the destructive processes in the mucosa become more intense, and consist largely of desquamation of the superficial epithelium and intense congestion of the denuded submucosa. In the more prolonged cases, "cholera-typhoid," the mucosa, especially above the ileocecal valve, may show diphtheritic necrosis. The serous surface of the intestines is injected. The kidney shows parenchymatous degeneration.

(To be continued.)

Clinical Report

A CASE OF GENERAL INFECTION BY THE DIPLOCOCCUS PNEUMONIÆ.

BLANCH N. EPLER, M.D.
KALAMAZOO, MICH.

Patient.—Mrs. P., aged 26. Family history negative. The patient had lived a questionable life, and about three years ago, after failing in general health, she was thought to be dying. No specific history could be obtained.

Examination.—The physician called found the patient with a high fever, coughing and expectorating. Right lung was tympanitic in areas and dull in other areas. The sputum was examined several times for the tubercle bacillus, but none was found. There were macular-like blotches on hands and face, especially on the forehead; there were lesions of herpes on the lips, which were swollen; there was no itching, no pain.

Treatment.—No diagnosis was made, though the patient was put on tuberculosis treatment. She seemingly recovered and the macular eruptions scaled off.

Subsequent History.—On June 22, 1905, my attention was called to the patient, who had been treated by the city physician, Dr. John B. Jackson. Seven days previously the patient complained of fever, vomiting and slight discomfort in the left elbow. During the five days after onset, temperature, pulse and respiration increased, but with no signs in the lungs or elsewhere to account for the symptoms. At the end of five days, the right lung showed distinct signs of pneumonia in the upper lobe and the elbow became swollen, red and tender. The urine showed much albumin, with coarsely granular and hyaline casts.

June 22: The seventh day after coming under medical care the pulse was 150, temperature 102, respiration 78, and the abdomen was distended. Till she died she was conscious, not especially weak, but very cyanotic and distressed.

Autopsy.—The autopsy showed some interesting points, and these only will be mentioned.

Pleuræ: Under the sternum, there were pleural thickening and adhesions, which, on examination, showed no tubercles; there were many pus cells, many blood vessels containing pus cells, hyaline degeneration and small, round-cell infiltration.

Lung: In the right upper lobe, there was gray hepatization; the remainder of the lung was edematous and congested. There were hemorrhagic areas and many pus cells.

Glands: The bronchial lymph glands showed congestion.

Kidney: The kidneys were congested, and in the cortex there was some small round-cell infiltration and an increase in the connective tissue.

Pelvic organs: These were normal, except for one or two small ovarian cysts.

Heart: This organ was slightly enlarged; the right ventricle was empty except for a large white clot, which obstructed the valves and extended into the auricle and pulmonary artery, the wall of which was of unusual firmness, white and glazed.

Right elbow: This was swollen, firm and red. On opening the joint a thin yellow pus presented, smears and cultures from which gave pure *Diplococcus pneumoniæ*. There was no erosion. Cultures and smears from the heart's blood and lungs gave pure cultures of the *Diplococcus pneumoniæ*.

Pathologic diagnosis: Purulent pleurisy: gray hepatization of right lung; antemortem clot; general infection and localized infection, with *Diplococcus pneumoniæ*.

Compulsory Notification of Tuberculosis.—This is a notifiable disease in Victoria. The *Intercolonial Med. Jour.* states that a physician has been fined for not complying with the law.

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THE AGGRESSIN THEORY.

Virulence, resistance, susceptibility and the like are terms commonly used with reference to infectious diseases to express certain properties of the infecting and the infected organisms. While they are useful, still it is true that very little is known of the real nature of the conditions designated. A great part of the experimental work now being done in infectious diseases is carried on with a view of making our knowledge on such points more precise and it is probable that in time these words will be replaced by more exact ones as new facts accumulate. Metchnikoff's phagocytic theory, Ehrlich's side-chain theory, the opsonic theory of Wright and Douglas have been of great service in elucidating many of these little understood phenomena and are opening up new problems of great practical importance.

A further contribution has recently been made to the problems of virulence and immunity in the form of the "aggressin theory" of Bail.[1] Apparently it grew out of an attempt to explain the so-called "phenomenon of Koch"—an observation made years ago by Koch—to the effect that tuberculous animals when inoculated intraperitoneally with a fresh culture of tubercle bacilli succumb quickly to an acute attack of the disease, the resulting exudate containing almost exclusively lymphocytes. Bail found that if tubercle bacilli, together with sterilized tuberculous exudate were injected into healthy guinea-pigs, the animal died very suddenly, i. e., in 24 hours or thereabouts. The exudate alone had no appreciable effect on the animal, while inoculation with tubercle bacilli alone produced death in a number of weeks. He, therefore, concludes that there is something in the exudate that allows the bacilli to become more aggressive, and hence has called this hypothetical substance "aggressin." He thinks it is an endotoxin liberated from the bacteria as a result of bacteriolysis and that it acts by paralyzing the polynuclear leucocyte, thereby preventing phagocytosis. Heating the exudate to 60 C. increases its aggressive properties rather than diminishes them and small doses act relatively more strongly than larger ones. These facts he explains by assuming the presence of two properties, one that prevents rapid death, is thermolabile and acts feebly in small doses, and one that favors rapid death and is thermostabile. He assumes that in a tuberculous animal the tissues are saturated with the aggressin and when fluid collects in the body cavities, as it does on injection of tubercle bacilli, it contains large quantities of aggressin which prevent migration of the polynuclear leucocytes, but not the lymphocytes, and hence allows the bacilli to develop freely, producing acute symptoms. In the peritoneal cavity of the normal animal, injected with tubercle bacilli, on the other hand, are large numbers of polynuclear leucocytes which engulf the bacilli, thus inhibiting their rapid development, there being here no aggressin to prevent phagocytosis.

Now this theory has been applied to a number of infections, including typhoid, cholera, dysentery, chicken cholera, pneumonia and staphylococcus infections. In all similar results have been obtained as with tubercle bacilli. When exudates, produced by virulent cultures of these various organisms and properly sterilized, are injected with fresh cultures into an animal, death occurs in much shorter time than when the organisms alone are injected.

Moreover, it has been possible to immunize animals against these various infections by repeated injections of the aggressin in the form of exudates. This results in the formation of an "antiaggressin," which opposes the action of the aggressin, thereby enabling the leucocytes to take up the bacteria and thus to protect the animal. This has been done in staphylococcus, dysentery, typhoid, cholera, pneumococcus, and chicken cholera infections in animals. In addition a very marked agglutinative property of the blood is acquired for the bacteria in the animals so immunized.

Naturally, a theory of this kind is certain to be criticized and we find that Pirquet and Schick[2] have raised the objection that is entirely unnecessary to assume the presence of an "aggressin," concluding that all the facts observed can be explained by the formation of antibodies by the tissues. They also call attention to the fact that analogous phenomena of hypersensitiveness occur in other conditions than bacterial infections, as, for instance, in the so-called "serum disease" (*Serumkrankheit*) in which after one injection of alien serum a second injection of serum may cause very profound and acute symptoms.

It is a curious fact that in the several contributions already made on this subject by the German investigators apparently not one word has been said with reference to the possible rôle that the opsonins of Wright and Douglas may play in the explanation of the phenomena described. The opsonic theory, i. e., that certain substances in the serum prepare bacteria for phagocytosis, certainly rests on a secure basis. In the normal animal phagocytosis may be assumed to take place freely because opsonins are present in the fluids; in an infected organism the opsonins may be reduced in amount; we know that many bacteria, living and dead, absorb opsonin. Consequently, the exudates and the

1. Wiener klin. Wochft., No. 9, 1905. Wiener klin. Wochft., Nos. 14, 16, 17, 1905. Berliner klin. Wochft., No. 15, 1905. Zeit. f. Hyg., vol. 1, No. 3, 1905. Arch. f. Hyg., vol. lii, pp. 272 and 411.

2. Wiener klin. Wochft., No. 17, 1905.

tissues of the infected animal would contain less opsonin. Hence phagocytosis would be diminished, and bacteria injected under these circumstances would develop more freely and largely unimpeded by the natural defenses so far as represented by phagocytosis. When sterilized bacterial exudates are injected, the opsonins normally present may be fixed by bacterial remnants and possibly neutralized also by proteins and other substances in the exudate. We know that complements and opsonins are very sensitive to chemical and other influences, and the introduction of exudate with bacteria, as in Bail's experiments, may, therefore, neutralize so much opsonin that active phagocytosis is suspended. Opsonins are destroyed by heating serum from 60 to 65 C. and this may explain the greater activity of infection described by Bail on injecting heated exudate; in this case, the little opsonin possibly present in the exudate was destroyed and phagocytosis still further crippled. Bail's explanations of the effect of heat on the exudates certainly appear somewhat labored. Now, what has been said here with reference to opsonin and its fate in infected animals and by mixture with exudate applies with equal force to complements on which depends the destruction of bacteria by lysis. For these and other reasons that can not be discussed now, it is evident that Bail's "aggressin theory" requires much further investigation, with special reference to opsonins and complements before its real value may be determined.

CELL PROLIFERATIONS IN GROWTH CENTERS AND THEIR RELATIONS TO REGENERATION AND TO TUMOR FORMATION.

Through the researches of embryologists it has been learned that, during the development of the more highly differentiated multicellular organisms, the cell divisions by karyokinesis, which are at first diffusely and more or less evenly distributed over the whole "cell state," gradually come to be definitely localized and regularly grouped. This localization and grouping of the karyokineses is a process which stands in intimate causal relation to the shaping of the form of the embryo, inside and out, as well as to the differentiation of the individual organs. In the places, then, where karyokinetic figures are met with in numbers, we have to deal with "construction centers" of the living substance, with areas of most intense growth; a study of the disposition of areas rich in karyokineses is, therefore, of the greatest importance for the localization of growth processes in a developing organism.

In the earliest embryonic period of higher organisms, all the tissues and organs grow by an increase of all their cellular components as long as the cells retain a more or less embryonic or indifferent character. As soon, however, in the course of the histologic differentiation of an organism and its parts, as the individual cell components have assumed a special structure and function and have become, to a certain degree, different from the type of the embryonic mother cell, the conditions of growth change. The specialization of function of the different cells occurs *pari passu* with a depreciation in omnipotence. The more highly differentiated a cell becomes, the more limited it is in the morphogenetic and physiologic potencies of the embryonic cell, until finally it loses temporarily, or even permanently, the capacity for proliferation. Thus, the majority of cartilage cells, bone cells, nerve cells, sensory cells, etc., are largely excluded from proliferative processes relatively early in development. Certain cell groups in these tissues, however, remain embryonic in character, more or less undifferentiated; these are the so-called growth centers, and in them alone is the capacity for cell proliferation retained. Schaper and Cohen[1] have recently made an exhaustive analysis of these growth centers in epithelial tissues and organs and in the central nervous system and sense organs. Their studies, they believe, have an important bearing on regeneration and tumor formation.

Schaper and Cohen assert that it is the persistence of a latent capacity for proliferation in these special growth centers that accounts for the phenomena of regeneration after pathologic disturbance of local correlations of cell function. If the pathologic condition destroys these growth centers, regeneration is impossible. For some tissues in man (ganglion cells, for example), no growth centers persist in the adult at all, and they never regenerate when once destroyed. A few tissues possess the power, even after differentiation, to regenerate by proliferation under special environmental conditions. The lower the degree of differentiation, the greater the power of regeneration; the connective tissue cells, for example, which are but little differentiated, possess great proliferative capacity, as do the epithelial cells which are arranged in one layer. In most tissues, however, only special areas or centers of undifferentiated cells persist, and it is these which participate especially in the processes of repair. When bone is injured, repair, if it is to take place, must be brought about by proliferation of the layer of osteoblasts on the inner surface of the periosteum. If the epidermis is to be regenerated, the palisade cells of the Malpighian layer are the ones to multiply. In necrotic processes in the intestine with formation of ulcers, as in typhoid fever, healing occurs through multiplication of groups of cells at special sites in the crypts of Lieberkühn, where the cells permanently retain an undifferentiated, embryonal character. In the uterus, after menstruation or during the puerperium, the mucous membrane is regenerated from the special "growth centers" in the fundi of the uterine glands. In glands like the liver, kidney and pancreas, some portions of the gland tubules remain less differentiated than others, and it is the cells of these which multiply in regenerative processes. Thus, in cirrhosis of the liver, the regenerative capacity of the finest interstitial bile

1. Schaper, A. u. C. Cohen, "Ueber zellproliferatorische Wachstumzentren und deren Beziehungen zur Regeneration und Geschwulstbildung," Arch. f. Entweckgsmech d. Org., Leipz., xix, 1905.

ducts becomes evident; in diseases leading to regenerative processes in the kidney, the cells of the straight tubules (not the convoluted) are able to multiply.

In view of the demonstration of the relation of these "growth centers" to normal development and to physiologic and pathologic regeneration, it is not surprising, perhaps, that Schaper and Cohen should attempt to press them into service to help to explain the origin of atypical non-inflammatory new growths or tumors. It is remarkable how frequently the "growth centers," or the places where embryonal karyokinesis persists longest, turn out to be sites of predilection for the development of tumors. It seems likely that the more exact localization of the "growth centers" will permit us better than ever to localize the starting point of tumors. Thus, if the theory be correct that tumors begin in the "growth centers," then it is likely that primary tumors of the liver will be found to begin in the finest biliary passages, tumors of the intestine in the depths of Lieberkühn's crypts, tumors of glands in the portions of their tubules which are least specifically differentiated, tumors of the epidermis in the Malpighian layer, chondromata in the perichondrium, gliomata in the ependymal wedges in the central nervous system. Thus far but little is known regarding the exact beginnings of tumors, but certain observations tend to support Schaper and Cohen's hypothesis. Partsch, for example, has found that the so-called "root cysts" of the teeth arise from elements of the epithelial sheath of the enamel organ; Ribbert believes that primary tumors of the liver do actually begin in the interstitial biliary capillaries; epithelial cerebral tumors appear to rise most often from the cells of the lowly differentiated choroid plexus.

The view that tumors have their origin in the "growth centers" accords very well with the Cohnheim-Ribbert hypothesis regarding the origin of neoplasms. The latter assumes (1) the presence in the body of cell material capable of proliferation, and (2) a stimulus which incites the abnormal proliferative activity, probably the result of the separation of the particular "embryonic" cell material from its normal organic connections and inhibitions. Schaper and Cohen localize the "proliferative cell material" in their "growth centers."

CONGENITAL TUBERCULOSIS.

There is evidently to be another swing of the pendulum of medical opinion with regard to the inheritance of tuberculosis, and, indeed, it is already well on the path of its next excursion. While a quarter of a century ago tuberculosis was universally conceded to be mainly a matter of heredity, in recent years medical opinion has gone almost entirely to the other extreme and has considered that the direct inheritance of tuberculosis is rather rare. Very few physicians were ready to concede that there was not at least an inherited predisposition to tuberculosis, but the actual transmission of the bacillus *in utero* was considered to take place only very rarely. The idea of contagion, then, practically entirely replaced that of heredity, and if children suffered more frequently from tuberculosis than older persons it was mainly because they were more exposed, and then, too, because they had less vitality resistant to the disease.

One excellent feature of this set of medical opinions with regard to the contagion rather than to the heredity of tuberculosis we hope will be maintained in spite of the change in medical opinion that we foresee. With the idea of contagion in mind, it is recognized that children playing about the floor are much more likely to come in contact with the bacilli of tuberculosis if there are any inmates in the household suffering from the disease and who are at all careless of the precautions necessary to protect others. This means not only carelessness in the matter of direct expectoration, but lack of care when coughing to keep something before the mouth in order to prevent the widespread distribution of material from the lungs on the atomized particles of sputa, which may be coughed to a considerable distance under such circumstances. As the result of the recognition of these dangers much good undoubtedly was accomplished.

There seems no doubt now, however, that the direct transmission of tuberculosis from mother to child is much more frequent than has been imagined. At the meeting of the National Association for the Study and Prevention of Tuberculosis, Dr. Wm. H. Welch of Baltimore declared that there are now many cases in which the presence of congenital tuberculosis has been noted. The principal proof for this is the great frequency with which tuberculosis of the placenta occurs in tuberculous women. Very few mothers who are suffering from tuberculosis in an active form fail to present tuberculous lesions of the placenta, when a careful investigation of that organ for this purpose is made. These lesions occur not only in advanced cases of tuberculosis, but also in the placentæ from patients who present scarcely more than the manifestations of incipient pulmonary tuberculosis. The disease must be in an active and not in a quiescent form, but it has been noted more than once that the strain of pregnancy itself seems to be sufficient to make a hitherto latent tuberculosis awaken into an activity that may prove dangerous for the offspring.

Dr. Welch considers that the rise in infant mortality from tuberculosis, which occurs during the second quarter of the first year of infant life, indicates that there has been a probable infection of the child during the latter part of the intrauterine existence. The incubation period of tuberculosis is not definitely known, but it is considered to be at least of several months' duration. If infection should take place, then, during the last three months of pregnancy it would be within the bounds of probability that the active manifestations of the disease would appear only some three to six months later.

It is not at all surprising that lesions of the placenta should be found. It is now well known that whenever tuberculosis is active and progressive, even though it may be only in an incipient stage, tubercle bacilli find their way into the circulation. They have been discovered repeatedly in the urine, having passed through a healthy kidney without causing serious effects. Not infrequently, however, their passage through the kidney gives rise to an irritative congestion causing a sense of weight in the loins of which consumptives not infrequently complain. That bacilli thus present in the circulation occasionally should find a resting place in the large vascular spaces of the placenta, where the circulation is less active, is only to be expected.

THE RED LIGHT TREATMENT OF SCARLET FEVER.

The treatment of the eruptive fevers by red light is no new proceeding, as there is some evidence that the Chinese and also some European nations employed it centuries ago. That they applied the treatment in the form now suggested seems doubtful, and there is evidence that they neglected to exclude ordinary light from the sick room, and that the hanging of the room with red draperies, and sometimes wrapping the limbs in red cloths, constituted the red light treatment of early days. Toward the end of the last century the work of Finsen put the matter on a scientific basis, and renewed the interest in this form of treatment. The philosophy of the treatment is based on the well-known fact that the so-called chemical rays in light, the blue, violet and ultra-violet, are capable of setting up inflammation in the healthy skin, and therefore are certain to aggravate the inflammation in a skin already diseased from some other cause. Finsen suggested the use of the red light treatment in smallpox particularly, and the results reported have varied, though they have been most encouraging, when the reporter closely followed Finsen's directions. This method of treatment has also been followed with some success in erysipelas, especially by Krukenberg, who has reported both improvement in the skin condition and rapid decrease in the temperature.

Quite recently Cnopf[1] of Nürnberg has reported some results with the red light treatment of scarlet fever which are distinctly encouraging. The method of applying the treatment in these cases is important, as all daylight must be permanently excluded until the eruption of the disease has completely disappeared. The windows for their lower two-thirds should be covered with some tissue completely impermeable to light, while the upper one-third should be covered with ruby red silk. At night the room should be treated as a photographic dark room and only lights with red shades should be allowed. The importance of completely excluding everything but the red rays is demonstrated by some of Cnopf's experiences. He found that even after the scarlatinal rash had apparently disappeared exposure to daylight for two or three minutes sufficed to bring it back. He was compelled, therefore, to make this test in all cases before allowing patients to be subjected to ordinary light. The effect of the red light treatment on scarlet fever is twofold. The fever, which under ordinary treatment usually persists until the rash fades, falls, almost by crisis, and reaches normal in three or four days instead of in seven or eight days, as is the case under ordinary treatment. The skin lesion is also markedly affected, the red color so characteristic of the disease gradually fading. The complications of the disease are apparently not affected, as in several of Cnopf's cases secondary angina or pneumonia served to cause an increase in the fever as usual.

The question naturally arises whether it is the red light or merely the exclusion of all light which is responsible for the changes noted by Cnopf. The query is an old one. Years ago it was noted that exclusion of all light from smallpox patients led to less pitting than daylight treatment. Cnopf, however, thinks that the mere exclusion of daylight is not the responsible agent, but that the red rays have an actual curative effect. How this effect is produced he does not pretend to say. However much we may be lacking in explanations of these observations, and however much we may doubt the actual value of the treatment, the success achieved seems to indicate that the method is worthy of more extended trial.

1. Münch. med. Wochft, No. 32, 1905.

COLLIER'S WEEKLY AND PATENT MEDICINES.

One of the most encouraging signs of the times is the fact that several lay journals have come out against the patent medicine evil. The opposition in most instances, however, consists in simply refusing to accept patent medicine advertisements of any kind. The most persistent, consistent and logical fight is being waged by *Collier's Weekly*, and there is scarcely a week but something appears that is to the point. Here is its comment on peruna and yellow fever, to which we referred editorially last week. It bears the heading, "Murdered by Advertisement."

Patent medicine horrors never reached a point of deeper degradation than in the yellow fever troubles of the South. Mr. Samuel H. Adams, whose series of articles will begin probably in five or six weeks, will hardly have anything more startling to narrate than the incredible performance of "Peruna" in alliance with the New Orleans *Times-Democrat*. This sheet has accomplished a feat of prostitution which, considering its pretense to respectability, probably sets the record. While the South is struggling to check a peril of the direst magnitude, this newspaper publishes an interview with "Dr. Hartman," with the familiar allegation that he "said in part," and all other devices to make it look like an important piece of news. Its headlines are: "How to Avoid Yellow Peril. An Interview with Dr. Hartman Concerning the Yellow Plague." To the reader this is the genuine opinion of a physician. He can not know that Dr. Hartman is the head of the Peruna Company, and that the *Times-Democrat*, in whom the reader presumably has some trust, is selling itself and the safety of its constituents for a bag of gold. "A summary of this interview," the *Times-Democrat* informs us, "is being spread broadcast over the United States *for the benefit of yellow fever sufferers.*" The gist of it is that, while screens

and other precautions are advisable, Peruna should be taken at once and continued during the whole course of the epidemic. "'I feel sure,' the doctor went on to say (!), 'that any person following this advice is in no danger of taking yellow fever.'" For anybody who believes we have taken too seriously the patent medicine evil and newspaper complicity therein, this unspeakable outrage should be a lesson. Is there anything to which men can not be led by money? To own a newspaper and hire it out to perilous fraud in an emergency like the yellow fever danger almost surpasses one's belief in human greed. No more disheartening proof of the need of the crusade which we have begun could possibly have been offered.

Evidently the writer of this article thought that the *Times-Democrat* was the only newspaper at fault. This is not true. Many of the Southern newspapers had the same advertisement inserted as telegraphic news, and these should accept with as good grace as possible the righteous castigation given them by *Collier's Weekly*. We understand that Mr. Samuel Hopkins Adams, who for months has been quietly conducting an investigation for this purpose, is preparing a series of articles for the weekly which will state facts regarding patent medicines in plain language. Judging from the following, he will also take up the quack doctor side:

The quacks are not to be omitted. The same investigator, whose inquiries into patent medicines are almost completed, is gathering material about medical abuses also. He hopes to have the opening article ready for publication in September. It will give an outline of the patent medicine industry, and will be followed by a number of articles on particular medicines and groups of medicines, beginning with Peruna. The quacks will follow in their turn.

Collier's Weekly deserves the support of every member of the medical profession.

THE EPIDEMIC RECEDING.

The situation in New Orleans continues to improve, while in the remainder of Louisiana there are some seriously infected points, but there is no longer a general increase of new cases and foci. The storm center of news for the past week has rested in Mississippi, with a lively subsidiary center at Memphis. Another town conspicuous for its boasted "air-tight" shotgun quarantine—Vicksburg—has been compelled to admit the presence of infection. In the case of several towns, infection has been discovered, or admitted, only after a person recently from the town has fallen ill with the disease elsewhere, thus leading to a tracing back of the infection. A notable and welcome feature of the week's news has been the *volte* face of Governor Vardaman. His views on quarantine and on methods of fighting the epidemic have come quite into accord with those of the best posted medical men, and for this much credit is due his willingness to be convinced. Arkansas has witnessed the most depressing of the week's events. Governor Jefferson Davis set aside the quarantine methods of the State Board of Health and four medical members, including the president and secretary, promptly resigned. Governor Davis also refused Surgeon-General Wyman's request to permit Passed-Assistant Surgeon Goldberger to pass by rail through a few miles of Arkansas in order to reach another point in Louisiana where his services were badly needed. From Southern Illinois comes news that persons turned back by the quarantine at Cairo are going up the Ohio and Wabash rivers and then entering the state. Along the Gulf coast the infection steadily spreads in mild form. So far as New Orleans is concerned, it now seems possible to state that modern methods have won. It is depressing to read that it was necessary to arrest a physician for failing to report cases. As a whole, the medical profession and the majority of the citizens are pulling together splendidly, and the result already is a matter for pride.

HEPATIC TOXEMIA AS A LATE EFFECT OF CHLOROFORM.

Of late years chloroform has been generally recognized as a more dangerous anesthetic than some others. Its toxic action, however, is usually manifested early, and as regards late effects it has been considered, perhaps, even safer than ether, the irritant action of which on the lungs, etc., is often dreaded. The communication of Drs. Bevan and Favill in this issue of THE JOURNAL and the extensive literature of similar cases which they quote suggest a peril in the late effects of chloroform which is evidently not generally recognized by the profession. It is probable, as they point out, that in many cases hepatic toxemia from chloroform is slight and shown only by transient jaundice and nervous symptoms of comparatively slight import, but that it may be overwhelmingly fatal seems to be indicated by the case they report and by others that they quote. The dangers of prolonged administration of chloroform are shown by the fatty liver degeneration produced in animals, which should itself be a warning against its prolonged use in any surgical operation. Its danger in young children and under the special conditions which Bevan and Favill enumerate as increasing the susceptibility to these late effects should be considered. It is not likely that chloroform will pass altogether into disuse, at least not until some efficient substitute, with all its advantages, has been discovered, but we are learning apparently more of its dangers all the time. It is something of a question whether, while underestimating the possible late effects of chloroform, we have not also overestimated those of ether. There seems to be much yet to be learned about anesthetics and their use.

THE SANITARY PROBLEM OF PANAMA.

Professor Vaughan's communication elsewhere in this issue states the conditions of success in the construction of the Panama canal as succinctly and forcibly as can be done. That the problem is first of all a sanitary one is well known to all medical men who have paid any attention whatever to the conditions existing on the Isthmus. Nevertheless, the difficulties which it involves have been too much ignored and, as Dr. Vaughan says, this was the main reason of the failure of the French canal company to complete its work. The canal can be built, as he admits, without special measures for sanitation, but at a cost of human life and treasure that is almost incalculable, to say nothing of the danger he mentions of involving other regions. The first thing to do is to render the region habitable for the great number of laborers of whatever nationality that will

have to be employed for years in the excavation and construction work. The task will be easier for us than for our predecessors, since we know more of the natural history of the diseases that must be combated. It is not the yellow fever that really is the most formidable of these. The ever-present malaria, especially in its pernicious form that is so common on the Isthmus, is a far more dangerous because a more persistent and less manageable foe. That the mosquito can be absolutely eliminated as a disease factor, especially on the low Atlantic side, is perhaps too much to expect, but malaria can be controlled even there to a great extent. It is a comparatively small part of the work at most that remains to be done in that region, and over the rest of the line of the canal the natural conditions are far more favorable. It is possible, moreover, that besides the protective vaccination from yellow fever suggested by Professor Vaughan, a careful study of the subject may develop some method of procuring sufficient immunity against the more serious forms of malarial disease or some parasite, as he intimates, that may be fatal to the mosquito. If the canal work can develop such results, it will be worth more to the world than the commercial value of the completed link of transit from ocean to ocean. Such an idea is not altogether visionary. No one expected from our contest with Spain sanitary results such as were attained, and which have been justly said to have been worth more than all the conflict cost. Aside from such possibilities, however, the sanitation of the Isthmus, to a very large extent, is practicable with the means at hand and it is a misfortune that these have not been fully utilized before. There are encouraging indications that the present executive management of this great work appreciates these needs and is taking steps to meet the conditions much in the way that our correspondent indicates. The undertaking is a national one. Our reputation as a people is largely involved in its success. It will be a pity if, through failure, it discredits American intelligence and efficiency. It is only by availing ourselves of every possible aid that sanitary science can give that the work can be creditably and successfully accomplished.

CASUALTY FRAUDS.

Continued exposure of the methods of those who make a business of getting injured and of collecting damages gives strong promise of ruining the industry. Theodore Waters contributes a fourth paper (in September *Pearson's*) recounting his own experiences in alleging accidents that never happened. In one city he was "hurt" early in the morning, and before noon lawyers' runners urged him to sue on a contingent fee contract, offering to furnish without additional charge all necessary witnesses and testimony. Once the retainer contract is signed the really injured person is thereby prohibited from accepting any proffered settlement, except through the retained lawyer. This shyster lawyer fees court attachés, hospital internes, police, notaries and factory foremen, all of whom can furnish valuable information and assistance. It is alleged that Chicago presents the largest number of illustrations of the "fake doctor" working with the "shyster lawyer" to defraud corporations. "For it can be laid down as an axiom that if there were no shyster lawyers, or doctors whose practices are without the code of medical ethics, there would be no profession of getting hurt." The strenuous methods of the medical profession to rid itself of this and similar impediments are not mentioned, probably because unknown to the writer. On the other hand he speaks decidedly of the evident degeneration of the morale of the legal profession during the last fifty years.

THE SIGNIFICANCE OF ACETONURIA FROM THE SURGICAL STANDPOINT.

The appearance of acetone in the urine has long been recognized as a danger signal in cases of diabetes, although investigation leads to the belief that the symptoms of intoxication often present under such conditions are in reality due to diacetic acid and B-oxy-butyric acid, of which the acetone appears to be a forerunner. The important practical significance of the detection of this state of acidosis resides in the possibility of neutralizing the condition by the administration of sodium bicarbonate. It has been observed further that a similar condition is not rarely encountered in cases that pursue an unfavorable course when submitted to anesthesia for the purpose of surgical intervention. With the object of determining the validity of previous observations and inferences in this connection, Dr. Joshua C. Hubbard[1] examined for the presence of acetone and diacetic acid the urine from 145 patients admitted during the summer of 1904 to one of the three surgical services of the Boston City Hospital. Acetonuria was found in 9 cases, associated with diacetic acid in 4, but all of these pursued a course perfectly consistent with the injury or disease present, and in none could any abnormality in convalescence be discovered that could be attributed to the state of the urine. In 4 of these cases diacetic acid also was present in the urine. In 5 cases in which acetone or diacetic acid or both were found during convalescence there was possibly a momentary disturbance, which yielded readily to treatment with sodium bicarbonate, administered in doses of 30 grains thrice daily or oftener. In 2 cases in which alarming symptoms developed and acetone was found in the urine, death ensued. The conclusion is accordingly reached that the presence of acetone in the urine, alone or in association with diacetic acid, in conjunction with symptoms of themselves alarming, especially vomiting, adds to the gravity of the prognosis.

COMMENDABLE SOCIETY WORK.

As the organization movement gathers momentum, medical societies here and there meet emergencies with effective society action. These deserve mention both to receive merited praise and, more particularly, to let all other societies know of the work accomplished and of the methods employed. By knowing what others are doing, local societies will be stimulated to do better work for the public and for the profession. A notable recent instance of collective medical aid to a suffering

1. Boston Med. and Surg. Jour., June 29, 1905, p. 744.

community is a "Circular of Information addressed to the Medical Profession for distribution among Trained Nurses and others entrusted with the care of yellow fever patients," that has been issued in attractive, well-printed form by the Orleans Parish Medical Society—at New Orleans. The circular is composed especially of an extract from the proceedings of the society's meeting on August 12, 1905. At this meeting Dr. Rudolph Matas addressed the society on "New Duties and Responsibilities Imposed on Trained Nurses and Other Persons Entrusted with the Care of Yellow Fever Patients, in Consequence of the Newly-acquired Knowledge of the Mode of Transmission of this Disease by the Mosquito." He pointed out the fact that the physician could only give the directions as to the new methods of prophylaxis, while others must execute them. In all, the brochure contains but 13 pages of well-digested and well-classified information regarding mosquitoes, fumigation, prophylaxis, etc., and it is admirably adapted to its purpose as well as being a very creditable medical society enterprise.

Medical News

ILLINOIS.

Smallpox.—Four cases of smallpox are said to have developed in Monmouth.——An inspector for the State Board of Health was sent to Hull, White County, August 28, where an epidemic of smallpox was reported.

Personal.—Dr. William C. Clarke, Cairo, has resigned his position as chief health inspector.——Dr. William A. Balcke, Cropsey, has returned from Bloomington, where he underwent an operation for appendicitis.——Dr. W. R. Hamilton, an aged physician of Peoria, was knocked down by a buggy and seriously injured, August 30.

Hospital Notes.—The hospital fund for Taylorville Hospital now amounts to more than $2,300.——The Misses Alice and Caroline Graham, Washington, D. C., formerly residents of Canton, propose to furnish the necessary grounds and to erect a public hospital building thereon at Canton, to cost about $15,000, and containing about twenty rooms, under the condition that an endowment of $20,000 shall be provided, that the hospital shall be free to all schools of medicine, and that at least five rooms shall be available for charity patients.

Illegal Practice.—John Pattie, Peoria, who was found guilty of practicing medicine without a license and fined $100 and costs, has appealed from the decision of the court, claiming that he practiced under the special direction of a licensed physician.——Dr. James M. Fernan, a "Quaker medicine man," known as Brother Paul, who is under indictment at Freeport under fourteen counts, five for selling drugs in violation of the state law, five for practicing medicine without a license from the State Board of Health, and four for selling medicines in the city without a license, has been found guilty and sentenced to pay fines with costs amounting to more than $2,000. Brother Paul has left town.

Chicago.

Personal.—Dr. Casey Wood has returned from Europe.——Dr. Louis L. McArthur has gone to attend the International Surgical Congress at Brussels.

Corner-stone Laid.—The corner-stone of the new Washington Park Hospital, Vincennes Avenue, was laid September 4. Among the speakers were Professor Mauritzon of Augustana College and Rev. A. J. Lofgren. The building will cost $50,000 and is expected to accommodate 105 patients. Dr. Carl O. Young is physician to the institution.

Deaths of the Week.—There was a reduction in the annual death rate, as compared with the week previous, from 14.68 per 1,000 to 13.25 per 1,000. The total number of deaths was 510. Of these 130 were due to acute intestinal diseases, 63 to consumption, 40 to violence, including suicide, 37 to heart diseases, 30 to Bright's disease, and 22 each to pneumonia and cancer.

August Mortality.—During August 2,436 deaths were reported, equivalent to a death rate of 14.31 per 1,000. The death rate for August, 1904, was 12.90, and that for July, 1905, 13.48 per 1,000. Of the deaths 727 were of infants under 1 year, and 246 of children between 1 and 5 years. Among the causes of death were: Acute intestinal diseases, 638; consumption, 224; violence, including suicide, 210; heart diseases, 153; Bright's disease, 149; pneumonia, 119, and cancer, 111.

INDIANA.

State Board Enjoined.—The State Board of Medical Examination and Registration has been temporarily enjoined from revoking the license of Dr. John Milton Rhodes, Indianapolis, who is charged with gross immorality.

Fined.—Dr. Albert E. Sterne, Indianapolis, was fined $25 and costs, August 1, for exceeding the speed limit with his automobile.——Dr. Joseph A. Hallanan, Logansport, was found guilty of assault and battery July 29, and fined $25 and costs.

Medical School for Purdue.—At the meeting of the trustees of the Purdue University, held September 1 in Indianapolis, the university accepted the gift of the Medical College of Indiana, which has a property value of $100,000. The college will not be moved to Indianapolis, but will continue its work as a part of the university.

Appointments.—The newly appointed Board of Health of Jeffersonville, of which Drs. David C. Peyton and William H. Sheets, Jeffersonville, are the medical members, has organized and elected Dr. Sheets secretary.——Dr. Mary L. Widdop, Indianapolis, has been made a member of the medical staff at the Indiana State Soldiers' Home, Marion.——Dr. William S. Walker has been elected secretary of the school board of Lafayette.——Dr. William R. Cravens, Bloomfield, has been elected surgeon to the Illinois Central Railroad.

Ill and Injured.—Dr. James N. Hurty, secretary of the State Board of Health, is confined to his bed with lumbago.——Dr. Percy E. Terry, Rochester, is reported to be critically ill.——Dr. Rufus F. Blount, Wabash, fell down the stairs leading to his office August 25, fracturing his clavicle.——Dr. Arthur W. Tucker, Logansport, was operated on for appendicitis August 20.——Dr. Omer P. Phares, Liberty, fell down stairs August 7 and sprained his ankle.——Dr. Seymour C. Wilcox, New Albany, is reported to be critically ill.

Abroad and at Home.—Dr. Charles E. Barnett, Fort Wayne, will start for Europe early in October.——Dr. David E. Mattison, Marion, sailed for Europe August 20.——Dr. James E. Johnson, Marion, has returned from Europe.——Drs. Thomas W. Moorhead, Myron A. Boor, Joseph H. Weinstein and Leo J. Weinstein, Terre Haute, have returned from an extended trip to Europe.——Dr. Austin Funk, New Albany, leaves for Europe this month.——Dr. Frank A. Morrison, Indianapolis, returned July 27 after five months in Europe.——Dr. David R. Ulmer, Alexandria, is in Scotland.——Dr. William F. Clevenger, Indianapolis, returned from Europe July 28.

Sickness and Deaths in July.—The deaths in July numbered 2,774, and in the same month last year 2,772. Diarrheal diseases were reported as more prevalent and the deaths from this cause numbered respectively 361 and 296, an increase this year over last of 21.9 per cent. Almost 80 per cent. of all diarrheal troubles occur in infants and very old persons. The deaths from preventable causes were: Consumption, 321; typhoid fever, 62; diphtheria, 16; whooping cough, 23; pneumonia, 63; cerebrospinal meningitis, 32; influenza, 6; puerperal fever, 9; violence, 174, and smallpox, 3. The cancer deaths numbered 110, or 6 fewer than in July of 1904. The deaths under 5 years of age numbered 791, or 29 per cent. of the total, and the deaths 65 years of age and over numbered 592, or 21.9 per cent. of the total. The consumption mortality was less than in July, 1904. Of the 321 deaths from this cause 229, or 71.3 per cent. of the decedents, were between the ages of 15 and 50. Only 20 cases of smallpox with 3 deaths in 7 counties were reported. In July, 1904, there were 114 cases, with 5 deaths in 21 counties.

KENTUCKY.

Did Not Report Fever.—For failure to report a case of scarlet fever Dr. David A. Coyle, Lexington, was fined $25 and costs August 22.

Typhoid Epidemic.—An epidemic of typhoid fever is reported at Vine Grove.——There have been reported more than 50 cases of typhoid at Clay. The epidemic is now said to be under control.

Diphtheria.—Diphtheria is so prevalent in Elmsville and Harvieland, Franklin County, that the county board of health

has prohibited all public gatherings.——Diphtheria is prevalent in Owensboro.

Personal.—Dr. Thomas E. Moss, Woodville, sailed from Seattle August 31 for the Philippine Islands.——Dr. William T. Leachman, Louisville, who has been in bad health for several months, has been taken to Martinsville, Ind.

LOUISIANA.

Stricken by Fever.—Drs. James T. Wolfe, New Orleans, and Louis A. Mereaux, St. Bernard, were stricken by yellow fever August 30.

Premedical Course.—The authorities of the Louisiana State University have decided to establish a premedical course, beginning in 1906.

Clinic for Women and Children.—The New Orleans Dispensary has been established at 1824 Annunciation Street for the purpose of giving free medical aid to poor women and children. Dr. Sara T. Mayo is in charge of the enterprise.

Personal.—Dr. D. N. Fletcher, Poland, was thrown from his horse, fracturing his arm near the elbow.——Dr. Thomas H. Watkins has been elected secretary of the Lake Charles Board of Health, vice Dr. Melvin F. Howe, resigned.

MARYLAND.

Baltimore Personals.—Dr. Eugene F. Cordell has resigned the position of editor of the *Hospital Bulletin* of the University of Maryland.——Dr. Charles F. Blake is critically ill with typhoid fever.——Dr. Emily Petersen has gone to Minnesota for several weeks.

Health Report.—The weekly report of the Baltimore health department for the week ended September 2 shows but 5 deaths from typhoid fever, although 143 cases of the disease were reported. For the entire month of August the following figures are here given: Deaths, 875; births, 915; deaths under 5 years of age, 361; deaths from typhoid fever, 34; cases reported of same, 324; mortality from Bright's disease increased from 36 in August, 1904, to 69.

Crisfield Marine Hospital.—A meeting was held in the Crisfield opera-house last week in the interest of the General Marine Hospital of that city, Dr. Jacob F. Somers presiding. The hospital is intended for poor sailors, who are brought there during the winter and are dependent on the charity of the place. The Woman's Christian Temperance Union has the work in charge and has almost enough money in hand to begin with. Among the directors are the state comptroller, Drs. Gordon T. Atkinson and W. F. Hall. Crisfield is one of the greatest centers of the Chesapeake oyster industry.

Embalming Legislation.—The question of legislation governing the embalming of bodies is being discussed by the Baltimore health commissioner, the state's attorney and the coroners. At present undertakers are allowed to embalm bodies prior to the issuance of death certificates by attending physicians, and it is consequently possible for a crime to be committed and for the perpetrator to go undetected, since arsenic and bichlorid of mercury enter largely into the fluids used. Dr. C. Hampson Jones suggests the creation of the office of state chemist, whose duty it should be to be ready at all times to make an analysis.

MASSACHUSETTS.

Bequests.—By the will of the late Dr. Louis A. Prefontaine there is devised to Mercy Hospital, Springfield, a powerful magnet, and $5,000 to be applied on the indebtedness of the institution.

Medical Frauds Denied Use of Mails.—Fraud orders have been issued against J. Tige, S. Ray, Amos Ball & Co., Dr. Charles C. Rothfuchs, Dr. Longest and Dr. Herrick Medical Co., all of Boston.

Will Build Leper Hospital.—The State Board of Charity has purchased the island of Penikese, in Buzzard's Bay, and a leper hospital will be constructed there. It is expected the building will be ready for occupancy in the autumn.

Typhoid in Worcester.—At the present time there are more than 40 cases of typhoid fever in Worcester and four deaths have occurred, caused by milk supplied by a single milkman, who has been forbidden by the Board of Health to sell any more milk.

Personal.—Dr. Maurice H. Richardson, Boston, has gone to Brussels to attend the International Surgical Congress.——Dr. Henri T. Gabowry, Taunton, was thrown from his buggy August 29 and sustained a slight fracture of the base of the skull.——Dr. William F. Whitney, Boston, has succeeded the late Dr. Edward S. Wood as expert on blood.

MISSOURI.

Personal.—Dr. Franz J. T. Specht, physician in charge of the North Side Dispensary, St. Louis, has resigned.

Low Death Rate.—The death rate for St. Louis for July is reported to have been at the rate of 16.39 per 1,000. During the month 887 deaths were reported, 277 of which, or 31.2 per cent. of the total, were in children under 5 years.

Expected No Deaths.—In the construction of the new City Hospital, St. Louis, it was recently discovered that no provision had been made for a dead house, and ground has been broken for the construction of this relatively important department of the hospital.

Illegal Medical Practice.—H. H. Morris, an osteopath, who has been practicing osteopathy at Marshall without a license, has pleaded guilty and thrown himself on the leniency of the court. The penalty provided ranges from $50 to $500.——Dr. B. H. Westfall, arrested at Craig, charged with being an itinerant vender of drugs and nostrums without a license, was fined $5 and costs at Oregon.

Hospital Notes.—The St. Louis Skin and Cancer Hospital, which has been established through the influence of the charitable women of the city, has opened its new building at Jefferson avenue and St. Charles street.——About 360 patients, lame, halt, blind and victims of disease or accident, have been moved from the old City Hospital into the new building recently completed.——Arrangements have been made to equip a room in the new Salvation Army Hall, Webb City, for a dispensary for injured miners.——The Knox County General Hospital, Rockland, was formally opened August 14.——A new Emergency Hospital for St. Joseph is now completed and ready for occupancy.——On August 21 the Kansas City Council voted an appropriation of $150.000 from the hospital fund to be used in the construction of a new general hospital.

NEBRASKA.

Hospital Site Bought.—A large new site has been purchased for the Clarkson Memorial Hospital, Omaha, at Twenty-first and Howard Streets.

Asked to Cease Practice.—Dr. George A. Angus, Lincoln, who was charged with cheating during his examination before the State Board of Medical Examiners, has been notified to cease practice, pending a rehearing of his case.

Peculiar Decision.—The Supreme Court holds that the State Electro-Medical Institute of Omaha can not be licensed to practice medicine as a corporation, but that, as a corporation, it may make contracts with physicians to do business and may collect for the services thus rendered.

Personal.—Dr. John K. Maxson, Lincoln, was committed to the Nebraska Hospital for the Insane, Lincoln, August 29.——Dr. Sidney S. Wilson, Nebraska City, is spending the summer in Europe——Dr. F. H. Redmond, Tecumseh, has been appointed ward physician in the incurable ward of the State Hospital at Osawatomie, Kan.——Dr. Edwin W. Cook, Plattsmouth, has been appointed head physician, for Nebraska, of the Modern Woodmen of America——The residence of Dr. Ulysses S. Ammerman, Reynolds, was totally destroyed by fire, August 26. The loss is about $2,000, with no insurance.——Dr. James W. B. Smith, Albion, has been appointed assistant surgeon, N. G., Neb., with the rank of first lieutenant, and has been assigned to the Second Infantry.

NEW YORK.

Permit Refused.—Thomas F. O'Brien, Buffalo, against whom a "no bill" was returned by a grand jury on the charge of violating the tenement laws, applied to the health department for a permit to run a lodging house and was denied.

Fraud Order Issued.—A fraud order has at last been issued by the government against the New York Institute of Physicians and Surgeons and "Prof." Thomas E. Adkins, its president, of Rochester. They advertised in newspapers and magazines extensively of their wonderful "vitopathic" cures (?).

All Bids Rejected.—The board of award of the Treasury Department, which has been examining the bids for the construction of the Marine Hospital to be built in Buffalo, has just reached the decision to report in favor of the rejection of all the bids. At present the Marine Hospital patients are being cared for by contract at the new Niagara Hospital.

Buffalo Personals.—Dr. Roswell Park has subscribed $1.000 for the formation of a school of liberal arts at the University of Buffalo, and Dr. Edward Clark $100 for the same purpose.——Dr. Benjamin G. Long has returned from the Pacific Coast.——Dr. Monroe Manges has returned from Atlantic City.——

Dr. Irving P. Lyon returned from a month's stay in the Adirondacks.——Dr. Allen A. Jones has returned from the coast of Maine.——Dr. Ray H. Johnson is taking a trip up the lakes.——Dr. Lawrence G. Hanley has resigned from the civil service board.

Fair for German Hospital.—A gift fair for the benefit of the German Hospital is to be held in the fall. Arrangements are being made on a large scale and it is expected not only that the entire indebtedness of the hospital will be paid, but that sufficient cash will be forthcoming to erect nurses' quarters and a new wing for private wards.——At a recent meeting of the medical staff sufficient was subscribed to pay for a team and ambulance.

New York City.

Bequests.—The German Hospital, Brooklyn, has received a bequest of $5,059.87 from the estate of Christopher Kunzel, deceased, and one of $1,000 from the estate of the late Mrs. Julie Achelis.

Laboratory Almost Ready.—The new laboratory of the Health Department at the foot of East Sixteenth Street, which has been in process of construction for a long time, will be ready for occupancy in a few days.

Personal.—Dr. Albert H. Ward, retiring house surgeon of St. Catherine's Hospital, Brooklyn, on leaving the hospital was given a dinner, at which he was presented with a case of surgical instruments.——Dr. Henry A. Baker, New York City, has been made medical director of the Washington Life Insurance Company.

OHIO.

Donations.—John M. Niles has presented to the Champaign Sanitarium his property, valued at $75,000, retaining a life interest in the estate.——The floral festival recently held in Van Wert netted $2,000 to the Van Wert County Hospital.

Hospital Notes.—Dr. William J. Gillette has erected a hospital in Toledo to accommodate 75 patients, which he expects will be ready early in the spring.——Delaware County Hospital, at Delaware, which is now almost complete, will be ready to receive patients early next month.

New Medical Society.—The physicians of Wellsville and East Liverpool have organized a society to be known as the Wellsville and East Liverpool Academy of Medicine. Dr. William M. Calhoun, East Liverpool, was elected president, and Dr. Arthur B. Holland, Wellsville, secretary.

Personal.—Dr. William H. Kanauss, Newark, who was accidentally shot while at target practice last May, has retired from personal work, as he has not yet fully recovered from the effect of the wound.——Dr. Louis L. Syman, Springfield, has resigned as a member of the hospital staff and has been succeeded by Dr. Wallace Ort.

The Afflicted.—Dr. D. B. Van Buren Burkett, Columbus, who was seriously injured a few weeks ago in a street car accident, is convalescent and will soon resume practice.——Dr. Arthur E. Hobson, Flushing, sprained his ankle in jumping from his buggy August 10.——Dr. Lewis J. Feid, Cincinnati, was thrown from his buggy in a runaway accident August 20 and painfully bruised.——Dr. William H. Booth, Salem, is seriously ill with typhoid fever at Lakeside.——Dr. Charles E. Reese, Lancaster, was thrown from his buggy in a runaway accident August 19 and seriously injured.——Dr. John A. Wright, Toledo, was seriously injured by the overturning of his buggy August 24, sustaining bad cuts and bruises.——Dr. Jerome Bland, Bucyrus, is in a serious condition from a recent cerebral hemorrhage.

OREGON.

Medium Fined.—On July 29, Judge Cameron found Louis Schlessinger, Portland, a medium who was accused of practicing medicine without a license, guilty, and fined him $75.

New Building for Medical Department.—Plans have been completed for the erection of a $15,000 building for the medical department of Willamette University, Salem. The building will be of brick and three stories high.

Health Board Changes.—The Mayor of Portland, Dr. Harry Lane, has appointed Drs. Esther C. Pohl, Andrew J. Giesy and George F. Wilson as members of the Medical Board of Health, succeeding Drs. Mae H. Cardwell, William Jones and James F. Bell.

Surgery Dedicated.—A new surgical department for the Good Samaritan Hospital, Portland, was dedicated August 8. Bishop B. Wistar Morris presided, and Drs. Simeon E. Josephi and George F. Wilson delivered addresses. The surgical equipment was presented to the hospital by members of the Couch family at the cost of several thousand dollars.

PENNSYLVANIA.

Philadelphia.

Will Study Cholera.—Dr. Fairfax Irwin, chief of the United States Public Health and Marine-Hospital Service in this city, and chief of the Reedy Island and Delaware Breakwater quarantine stations, has been ordered to Hamburg, Germany, to study the cholera situation.

Bequests.—By the will of Hannah Burgess, St. Mary's Hospital will receive $300.——By the will of Thomas Woolman, the Frankford Insane Asylum receives $2,000; Red Bank Sanitarium Association, $1,000, and the Children's Country Week Association, $1,000.——By the will of Louisa Baumann each of the following institutions receives $1,000: German Hospital, Orphans' Home of Germantown, and the Philadelphia Home for Incurables.

Personal.—Dr. E. J. Beardsley sailed for Europe on the *Friesland*, September 2.——Dr. Francis D. Patterson has been appointed examining physician of the State Constabulary.——Dr. Joseph Roberts, Camden, N. J., has been appointed skiagrapher in St. Joseph's Hospital, vice Dr. Flynn, resigned.——Dr. John Stanton has been appointed assistant chief of the out-patient nose and throat department of the Children's Hospital.——Dr. J. L. Harkness has been appointed chief of the laryngological department of Jefferson Hospital.

Health Report.—The deaths from all causes during the week aggregated 437, or one less than the number reported the three previous weeks, a coincidence never before known in the health bureau's history. For the same period of last year the deaths numbered 371. There is a decided decrease in contagious diseases, particularly typhoid fever. The principal causes of death were as follows: Typhoid fever, 15; diphtheria, 5; whooping cough, 7; consumption, 41; apoplexy, 20; heart disease, 25; acute respiratory diseases, 29; enteritis (under 2 years), 45; enteritis (over 2 years), 9; Bright's disease, 36; appendicitis, 4; injuries, 13; suicides, 5. There were 117 cases of contagious disease reported, with 20 deaths, as compared with 142 cases and 15 deaths for last week. The deaths from typhoid fever numbered 15, an increase of 5 over those of last week. There were 62 cases reported during the week, as compared with 82 cases the previous week, and 125 three weeks ago.

UTAH.

State Hospital Changes.—Dr. David H. N. Calder has been appointed medical superintendent of the State Mental Hospital, Provo, vice Dr. Milton H. Hardy, removed——Dr. Frederick Clift, Heber, has been appointed assistant medical superintendent of the State Mental Hospital, Provo.

Hospital Notes.—The White Cross Sanitarium and State Emergency Hospital has been established in Salt Lake City, at 253 S.W. Temple St.——A building permit has been issued for a brick addition to the Dr. Groves Latter Day Saints Hospital at Salt Lake City, to cost $10,000.

Personal.—Dr. John S. Gordan, Ogden, has been appointed physician of Weber County, vice Dr. Harry B. Forbes——Dr. Charles F. Wilcox, Salt Lake City, was struck over the eye by a horseshoe thrown by a boy and suffered an extensive scalp wound——Dr. Chauncey M. Benedict, Salt Lake City, has been reappointed assistant surgeon general of the National Guard of Utah.

VERMONT.

Personal.—Dr. Marcello Hutchinson, superintendent of the State Hospital for the Insane, Waterbury, has been seriously ill with nephritis, but is now improving.——Dr. Charles L. Ervin, Newport Center, has been appointed trustee of the State Asylum for the Insane at Waterbury.

Hospital Officers Elected.—At the annual meeting of the St. Alban's Hospital Association the following officers were elected: Vice-president, Dr. Theodore R. Waugh; secretary and clerk, Dr. E. I. Brown, and managers of the institution, Drs. Theodore R. Waugh and Dr. Stephen W. Paige.

Impure Food.—The State Board of Health has been investigating the food products for sale there, making 118 tests. Of 38 samples of maple sugar and syrup, 5 were adulterated; 2 samples of oysters had boric-acid preservatives; 12 out of 15 samples of lemon extract were impure, 3 containing coal-tar dyes; other adulterated products were, vanilla extract, baking powder and ginger champagne.

Dedication of College.—The dedication of the new medical college building of the University of Vermont, Burlington,

took place June 27. The building was presented to the Board of Trustees by Dr. Henry C. Tinkham, dean of the medical department and chairman of the building committee. The building was accepted in behalf of the Board of Trustees by Mathew H. Buckham, president of the University. A history of the medical department was then given by Dr. J. H. Woodward, class of 1882, New York City.

VIRGINIA.

Hospital Notes.—Mrs. Thomas F. Ryan will shortly begin the erection of a hospital in Lynchburg, three stories high and fireproof throughout, to cost $100,000——A new story has been added to St. Luke's Hospital, Richmond.——The Dunlop Memorial Hospital, Petersburg, which has just been completed and is now ready for use, was erected by Mrs. Mary Corling Dunlop in memory of her husband, the late David Dunlop——The new King's Daughter Hospital, Staunton, erected at a cost of $20,000, was dedicated July 1.

Personal.—Dr. Stuart McGuire, Richmond, has been made president of the University College of Medicine, vice Dr. Allison Hodges, resigned——Dr. Robert H. Whitehead of the medical department of the University of North Carolina, Chapel Hill, has been elected professor of anatomy and dean of the University of Virginia Medical Department, Charlottesville——Dr. Joseph M. Burke, Petersburg, has been appointed general surgeon of the Seaboard Air Line——Dr. Edward L. W. Ferry, Miller's Tavern, was injured in a runaway accident, August 6, sustaining a fracture of the jaw.

GENERAL.

Plague at Panama.—A case of plague which terminated fatally is reported from La Boca.

Cholera in Manila.—Eleven new cases of cholera have been reported from Manila. The total number of cases since the outbreak is reported as forty, with twenty-five deaths.

Quarantine Against Panama.—The president of Nicaragua has issued a proclamation declaring the ports of that country closed to all vessels from Panama because of reports of the presence of bubonic plague in the latter republic.

New York and New England Association of Railway Surgeons.—The fifteenth annual meeting of this association will be held at the Academy of Medicine, New York City, Nov. 17-18, 1905, under the presidency of Dr. G. P. Conn, of Concord, N. H. One-half day of the meeting will be devoted to a symposium on "Injuries to the Head and Spine."

Mississippi Valley Medical Association.—At the next meeting of the Mississippi Valley Medical Association, to be held at Indianapolis, Ind., October 10-12, the annual addresses will be delivered by Dr. Arthur R. Edwards, Chicago, on "Certain Phases of Uremia, Their Diagnosis and Treatment," and by Dr. W. D. Haggard, Nashville, Tenn., on "The Present Status of Surgery of the Stomach."

Pacific Coast Surgeons Meet.—At the third annual meeting of the Pacific Association of Railway Surgeons, San Francisco, August 17, the following officers were elected: President, Dr. Thomas W. Huntington, San Francisco; vice-presidents, Drs. Thomas C. McCleave, Berkeley, Cal., and William O. Spencer, Huntington, Ore.; Secretary, Dr. James P. Dunn, Oakland, Cal., and treasurer, Dr. Frank L. Adams, Oakland.

Seaboard Air Line Surgeons Meet.—Surgeons of the Seaboard Air Line recently met in annual convention at Old Point Comfort, Va., and elected the following officers: President, Dr. Gottlob A. Neuffer, Abbeville, S. C.; vice-presidents, Drs. W. C. Monroe, Sanford, Fla., Gray G. Holladay, Portsmouth, Va., and Jarrett W. Palmer, Ailey, Ga.; and chairman of executive committee, Dr. Southgate Leigh, Norfolk, Va. The 1906 meeting will be held in Savannah, Ga.

American Roentgen Ray Society.—The sixth annual meeting of the American Roentgen Ray Society will be held at the Johns Hopkins Hospital, Baltimore, September 28-30. The Stafford Hotel has been selected as headquarters. The program includes papers by foreign as well as by American workers in this special department of medicine. All regular practitioners are eligible to membership in the society and are invited to attend the scientific sessions and to view the exhibition of apparatus. Further information can be obtained from the secretary, Dr. Russell H. Boggs, Empire Building, Pittsburg, Pa.

Cumberland Valley Medical Association.—At the third annual meeting of this association held at Mount Holly Park, Md., the following officers were elected: President, Major James Evelyn Pilcher, M.D., Carlisle, Pa.; vice-presidents, David F. Unber, Mercersburg, Pa., Augustus C. Maisch, Hagerstown, Md., and George C. Borst, Newville, Pa.; secretary, Dr. John J. Coffman, Scotland, Pa.; assistant secretaries, Drs. Philip R. Koons, Mechanicsburg, Pa., Henry C. Devilbiss, Chambersburg, Pa., and DeWitt C. R. Miller, Mason and Dixon, Pa.; and treasurer, Dr. John J. Koser, Shippensburg, Pa. Major Pilcher presented a memoir on the "Medical Lessons in the Far East," in which he illustrated by the success of the Japanese medical department, the importance of state medicine and of the active participation of physicians in public affairs. At the annual banquet Major Pilcher presided as toastmaster.

Postal War on Medical Pretenders.—According to the Philadelphia *Record*, the postal authorities are attempting to rid Philadelphia of "quack" doctors, fake medical men, etc. On August 28 over a score of persons "who have been advertising in a manner which the authorities consider objectionable were summoned to the postoffice to identify themselves before they could secure mail addressed to them." All the visitors were questioned by the postal inspectors and warned against carrying on their business through the medium of the mails. The position of most of them is such that the federal authorities can take no legal steps, because no overt act has been committed of which the authorities have any knowledge. Several of those summoned had written very plain letters, ostensibly to some woman, but really to the inspectors, offering to perform an illegal operation for a special price; but it is necessary to show that an operation was performed in consequence of the writing of the letter. The empty promise to commit a prohibited act for pay does not constitute a crime. According to the *Record*, publications which have been printing the offending advertisements were also notified by the postal authorities that they must cease publishing them or suffer prosecution.

THE YELLOW FEVER SITUATION.

Louisiana.—The situation among the fishing settlements in Jefferson parish has become very bad.——On the sugar plantations the disease still spreads.——Quarantines are being modified.——During the week the following new cases have been reported: Havelona plantation, 6; Patterson, 16, 2 deaths; Port Barrow, 2; St. Rose, 19; Amelia, 12 and 1 death; Bayou Bœuf, 9; Houma, 2; Ardoyni, 3; Kenner, 19, 2 deaths; Hanson City, 13, 1 death; St. Bernard, 7; Point La Hoche, 2; Pecan Grove, 8, 1 death; Belmont, 1; Elizabeth, 1, 4 deaths; Donaldsonville, 4; St. Gabriel, 1; Alexandria, 1; Smoke Bend, 2; Shaffer plantation, 30; Lendale, 1; Belle Grove, 6; Terrebonne parish, 2, 1 death; Riverside (to August 31), 134, 5 deaths; Leeville (to September 1), 321, 29 deaths; La Place, 7.——Dr. Milton F. Smith, health officer at Shreveport, writes that only three cases have occurred there, with one death. All the patients came from New Orleans and were held in detention.

New Orleans.—Surgeon White has ordered compulsory fumigation of houses, including those whose occupants are out of the city.——As a step to educate the public and in addition to lectures, the city newspapers have reprinted in full the medical papers recounting the steps in the discovery of mosquito conveyance.——The federal officers on August 22 decided to put a quietus on Dr. Leach and the arsenic fad. It was published that he had, in 1890, urged arsenization for yellow fever, cholera and bubonic plague. Surgeon-General Sternberg's unfavorable report was reprinted. Further, Surgeon White showed that arsenized persons were then under treatment for yellow fever. This proved to be too much for Dr. Leach, who beat a retreat to Minnesota, bewailing his "unfair treatment." It is estimated that up to August 22 some 7,000,000 arsenic tablets "prepared under the direction of Dr. Reginald Leach, arsenical expert," had been taken by New Orleans people in the last two weeks. Just before he left his supports voted to aid the federal service in all its work, thus closing the arsenic incident.——The Orleans Paris Medical Society has issued and distributed an attractive and practical pamphlet addressed to physicians, trained nurses and others entrusted with the care of yellow fever cases.——New Orleans people who have been away on vacations are now freely returning.——Dr. J. T. Wolff and Dr. L. A. Meroux have the fever.——All the authorities on September 1 joined in signed statements that the crisis was past and the fight won.——On September 2 there were but 29 new cases, with 3 deaths. Total cases to September 3, 2,037; total deaths to September 3, 294; death rate, 14.4 per cent.——Dr. Philip Berge was arrested September 2 for failure to report 2 cases of yellow fever.——Surgeon White has joined with the New Orleans Medical Society in asking that moving day be postponed from September 1 to October 1.

Other States.

Arkansas.—Governor Jefferson Davis annulled the permits and certificates of health issued by the State Board of Health, ordered that no attention be paid to any sort of certificate of health, ordered that no railroad crews cross the boundary line from Louisiana, and refused to permit Dr. Goldberger of the United States Public Health and Marine-Hospital Service to pass by rail over a few miles of Arkansas territory on an errand of mercy to another point in Louisiana. Dr. G. M. D. Cantrell, president; Dr. R. B. Christian, secretary, and Drs. W. H. Miller and W. B. Hughes at once resigned from the State Board of Health.

Florida.—Three cases, all among Greeks, of yellow fever were announced at Pensacola on August 29. Up to September 2, 8 cases had been found there, and there had been one death.

Illinois.—In the Springfield *Register* of August 25 Secretary Egan of the State Board of Health was quoted as pronouncing as "an unmitigated lie" the story of a case of yellow fever at Brownsville.——A car of 35 Paducah residents from Chicago is said to have been held in Cairo, locked in the car, for a number of hours.

Kentucky.—Paducah has not yet defied the State Board of Health by quarantining, but has appointed a train inspector and has ordered that only the health officer may give certificates of health.

Mississippi.—The Greek who died at Gregory, Mo., of yellow fever was but recently arrived from Natchez, Miss., but on August 21 Natchez assured the world that "there has not been the slightest suspicion of yellow fever here since 1898." Yet on August 27 cases were reported from Natchez, the report denied by the health officer on August 27, and on August 29 Surgeon Wasdin, Marine-Hospital Service, positively diagnosed 9 cases and noted 5 suspects. Since then 2 additional cases have been reported.——Dr. John Guiteras on August 30 made a positive diagnosis of yellow fever in two white persons, neither of whom, it is said, had been out of Vicksburg for two months, and both of whom were within the protection of a close shotgun quarantine. Five more were found in the next two days.——Gulfport, which for the last time on August 21 announced that it had no cases of the fever, has since reported 16 cases, all occurring within quarantine.——Mississippi City was visited August 13 by Dr. Sanders and Dr. Mohr of the Alabama health board, who thought they found a suspicious case. Surgeon Wasdin saw the patient a day later and said it was not yellow fever, but a local physician asked him to see another case which was yellow fever, and then others were unearthed. As in some other places, the cases were so mild that they easily escaped diagnosis.——The Mississippi state notification law is simple and effective if enforced, providing $50 fine and ninety days in jail (the statutory penalty for a misdemeanor) for any physician who fails immediately to notify the secretary of the State Board of Health of any case of yellow fever, cholera, dengue, smallpox, or any other virulent epidemic contagious disease.——Governor Vardaman on September 1 commenced the work of the Marine-Hospital Service and asked for its help at Natchez and Vicksburg. He also has recently recommended more rational quarantines, especially not to restrict movement of freight. His general attitude has become decidedly helpful.

Oklahoma and Indian Territories.—On August 26 the state quarantined against Louisiana.——Indian Territory fears it has a case of yellow fever at Maysville.

Pennsylvania.—Dr. Thomas J. Mays, Philadelphia, had a letter in the New York *Sun* of August 29 calling the mosquito etiology of yellow fever "one of the most disastrous of medical errors," and writing of "the presumptuousness of the germ theory."

Tennessee.—Memphis was much aroused by Surgeon White's report that a Memphis woman fell ill with yellow fever on the day of her arrival in New Orleans. Quarantines against Memphis followed. Governor Vardaman of Mississippi and Secretary Hunter of the state health board went to Memphis to investigate. Charges against Surgeon White were threatened, but the date on the Memphis health certificate held by the patient appeared fully to substantiate Dr. White's conclusion.——Governor Cox notified the quarantine officials of Grand Junction, in Hardeman County, not to interfere with transfer of passengers from train to train, telling them he would send militia there if the interference continued.——The inspection service on trains in and out of Chattanooga has been assumed by the United States Public Health and Marine-Hospital Service at the request of the State Board of Health.——Memphis had a sensational flare-up over apparent conflict of authority between the police and the health officer, which appeared as a misunderstanding and which resulted in the health officer keeping his own inspectors.——Governor Cox on September 1 sounded the governors of southern states as to a conference on immigration and quarantine.

Texas.—The state quarantine office at Beaumont has been closed.——The Mexican border is closely watched.——The banks are not taking up the deficiency bonds offered by the state health officer.

FOREIGN.

Russian Red Cross.—The Russian Red Cross has spent about $11,000,000 in the course of the present war. During July the total expenses of its various hospitals were only $150,000, but they are much higher after a battle.

Asiatic Cholera in Prussia.—Cholera seems to be spreading in West Prussia. Twenty-two cases and six deaths are reported. Twelve sanitary stations have been established along the Weichsel river, and the Prussian government is sending physicians from other ports of Germany to assist the local health authorities.

International Congress of Anatomy.—The first International Congress of Anatomy was held recently at Geneva. The following anatomic societies took part: The anatomic societies of Great Britain and Ireland, the German *Anatomische Gesellschaft*, the Association of American Anatomists, the *Unione Zoologica Italiana*, and the French *Association des Anatomistes*. Nearly 200 individuals attended. The scientific proceedings were of great interest. The next meeting will be held at Bordeaux, France, at Easter, 1906, under the presidency of Professor Viault.

Pharmacology

Secrecy.—Whatever is secret is suspicious; this especially applies to medicines.

Patent and Secret Proprietary Medicines.—Some weeks ago we published a letter from Mr. Bok of the *Ladies' Home Journal* in which he appealed to physicians for aid in the fight against patent medicines. Since then some correspondence has passed between Mr. Bok and the Editor of THE JOURNAL. The last letter received was accompanied with a number of advertisements clipped from medical journals—and we regret to say some were from THE JOURNAL of the American Medical Association, one of which is still there and probably will be till the contract expires—with a query, "What is the difference between these and 'patent medicines'?" No reply has been sent, as we are not able to answer. If any of our readers can tell the difference between most of the secret proprietary medicines that are advertised to physicians in medical journals and patent medicines that are advertised to the public in newspapers, we hope they will inform us so that we can reply to the editor of the *Ladies' Home Journal*.

Reading Pages for Sale.—The following is a copy of a letter in our possession, the original of which was sent to a manufacturing pharmaceutical firm by a monthly medical journal, which is supposed to be up to the average at least in its ethical conduct. It shows clearly the *Deus ex machina* in the administration of certain medical journals:

> GENTLEMEN:—We hope this letter will induce you to place a special contract for our special June issue, which is to be issued in honor of the Portland meeting of the American Medical Association. This issue will have a circulation of 12,000 copies, and will be read by the best men in the profession.
>
> You should take a page or two pages for a special advertisement of your ————. The cost for one page is $25, for two pages $40. *Should you place a contract for this issue we shall publish a three-hundred-word report in your interest in our reading columns.* We know it would be to your advantage to be in a special issue that will reach the leading men of the profession.
>
> We trust you will be with us, and thanking you for the courtesy of an early reply, we beg to remain,
>
> Yours sincerely,
>
> ————

Official Carlsruhe Warning Against Irregular Practices.—THE JOURNAL has mentioned from time to time the official notices published by the municipal authorities of Carlsruhe warning the public against certain irregular practitioners and against proprietary medicines, etc., which are advertised in the local press or on the billboards. The list includes a number of American nostrums. The instigator of the warnings is the *Stadrath* or mayor, who is earning the encomiums of all interested in protecting the public health and pocket. He has recently had all the warnings collected and published in a booklet of 148 pages, which is offered for sale by the publishing house of G. Braun, Carlsruhe. The *Deutsche med. Wochft.* suggests that this booklet deserves a place on the table in the waiting room of every physician. It will bear translating into all languages, as many of the nostrums it describes are advertised in all civilized countries.

The Control of Proprietary Remedies.—A serious attempt is being made by the Council of Pharmacy and Chemistry of the American Medical Association to control the various secret remedies which are put before the medical profession in that country. The following particulars of the scheme are taken from a copy of the rules for which we are indebted to the courtesy of a well-known firm of druggists. It appears that in the United States of America there is a rapidly growing sentiment against the increasing legion of secret preparations. THE JOURNAL of the American Medical Association conceived the idea of forming a board of control, to be composed of pharmacists and chemists, which should pass in review all medicinal preparations offered for insertion in the advertising pages of that journal. That idea has been modified by making the functions of the proposed board similar to those of the Committee of Revision of the United States Pharmacopeia. The work is to be taken up where that committee left off, and a description of the unofficial preparations which conform to the required standard will be published in the form of a book to be entitled "New and Unofficial Remedies." In other words, it will form an extra pharmacopeia, giving useful details of reputable preparations. The board of trustees of the American Medical Association has authorized the formation of an advisory board, to be known as the Council of Pharmacy and Chemistry, to carry out the work. The council is composed of men eminent in medicine and pharmacy as writers, teachers and research workers. The Council proposes immediately to examine into the composition of the various medical preparations that are offered to physicians, and are not included in the United States Pharmacopeia or in other standard text-books or formularies. In the rules here given the term "article" is applied to any drug or preparation used in the treatment of disease.

(Here follow the Rules of the Council.)

The manufacturers of legitimate preparations have nothing to fear from this action on the part of the American Medical Association. On the contrary, they are to be congratulated that the Association has undertaken to separate the wheat from the chaff. In this country, medical practitioners are overwhelmed with samples and literature of preparations which may be good, bad or indifferent. The composition is not usually disclosed and the habit is formed of throwing all aside, the good and the bad together. The list of unofficial preparations of known compositions and strength when published by the American Medical Association should prove valuable to the medical profession and a safeguard to the public. Measures of similar character might with advantage be adopted in this country. It should not be difficult to find funds for the purpose, especially if a working arrangement were made with the American Medical Association whereby each country should investigate its own products to avoid covering the same ground twice.

Though the rules adopted by the American Medical Association are good and worthy of imitation, they are not sufficiently comprehensive to nullify entirely the present system, which leads to self-drugging. The weak points are not hard to find. Let it be imagined that a practitioner prescribes a preparation which is labeled on the lines laid down in the rules as follows: "A hypnotic and sedative, containing three-quarters of a grain of morphin in 110 minims. Dose 5 to 30 minims." Unless the practitioner initials and dates the prescription whenever he requires it to be repeated there is nothing to prevent the repetition of the prescription dozens and even hundreds of times. Pharmacists should be requested to consider it a breach of etiquette to copy a prescription for a patient or to make it up for any other person. Again, it should be a rule that no proprietary medicine should be delivered to the patient in the original package in order to prevent the purchase of further supplies without a prescription. The excellent rules of the American Medical Association should therefore be supplemented by further rules for the guidance of pharmacists on these points touching the repetition of prescriptions and the transference of medicines from original packages before delivery to the patient. A set of rules of this kind, supplemented by a more complete code of pharmaceutical etiquette, would benefit alike the public and the medical profession and should find a place in the system of medico-pharmaceutical ethics.

Again, it is obvious that another weak point in the proposed scheme is that it will almost of necessity fail to touch the very class of secret or proprietary remedies which are productive of the largest amount of self-drugging—viz., so-called "patent" medicines produced for the express purpose of appealing to the credulity of the multitude. Since the proposed list is rightly intended solely for the use of medical men the failure to secure recognition will hardly be of any material detriment to the sale of such preparations which will still be advertised in the lay journals and reach the public for whom their proprietors cater.—(Editorial, *The Lancet*, Aug. 12, 1905.)

[*The Lancet* is correct in its last paragraph. The patent-medicine evil should be assailed, but the proprietary nostrum must first be eradicated. Before we can proclaim war on patent medicines, with energy and with a clear conscience, it will be necessary for us as physicians to rid ourselves of the proprietary nostrum evil by ceasing to prescribe preparations that are nothing more nor less than patent medicines. Before medical journals can criticize newspapers for carrying patent-medicine advertisements, they must themselves refuse advertisements of similar preparations, even though these be dignified with the name of proprietary medicines. THE JOURNAL of the American Medical Association itself is not yet entirely free from this reproach, but it is freeing itself as rapidly as undesirable contracts expire.—ED.]

Correspondence

The Construction of the Panama Canal, a Sanitary Problem.

ANN ARBOR, MICH., Aug. 31, 1905.

To the Editor:—In view of the fact that yellow fever is prevalent in Panama, and in view of the statement that more than 60 per cent. of the people in the Canal Zone are now infected with malaria, and in view of the report of the presence of the plague on the isthmus, it seems unnecessary to argue that the method followed by this government up to the present time, in the construction of the canal, has not been characterized by wisdom. Please permit me to offer the following statements, which, in a condensed way, represent my views concerning the means that should be adopted in the carrying out of this great enterprise. These suggestions I have hurriedly condensed and will state as follows:

1. The first thing that should be done is to render the Canal Zone a habitable place. That this has not been done, although we have been in possession for more than two years, must be admitted by all.

2. The engineering problem involved in the construction of the Panama canal is of secondary importance compared with the sanitary problem which must be met.

3. The French failed to complete the canal, not because they had not the engineering ability necessary to do it, but because they were wholly unable to cope with the insanitary conditions existing in that locality.

4. In converting the Canal Zone into a habitable location, engineering skill must be employed, but it will be only a

secondary and a subordinate part of the work that must be done in accomplishing this great task.

5. In rendering the Canal Zone habitable, sanitary authority should be supreme and should control and direct all other agencies.

6. A thoroughly equipped scientific laboratory, provided with the best obtainable in the way of apparatus and men, should be provided and put into operation on the Isthmus of Panama.

7. The work so auspiciously begun by the lamented Reed and his colleagues should be continued.

8. The number of men employed on the isthmus during its sanitary development should be as small as is consistent with efficiency.

9. These men should be protected from the mosquito by mechanical devices applied to the individual as a part of his dress, or to a small group of men in the form of areas covered by mosquito bars.

10. During the sanitary development travel between this country and the isthmus should be as nearly as possible confined to the winter months, and should at all times be restricted and closely guarded in every scientific way in order to prevent the importation of infection into the United States.

11. Expert sanitary workers, together with expert entomologists, should be employed in the scientific laboratory and should be given every facility which their investigations may demand.

12. The mosquito should be subjected to the closest inspection with the purpose of securing its extinction.

13. The conditions under which the mosquito breeds and the effect of insecticides on it at this and other times should be carefully and scientifically investigated.

14. The parasites that infest the mosquito should be studied and, if found desirable, be scattered all over the isthmus. In this connection I wish to state that Dr. Lamb, of Owosso, Mich., who served some years with the army in the Philippines, has informed me that there is a louse that feeds on certain mosquitoes and destroys them in a few hours. Whether this could be used in the extermination of the stegomyia or not can be determined only by experiment and observation.

15. Vaccination with a modified virus of yellow fever should be studied most thoroughly, because in this direction there is the possibility of securing immunity to the disease.

Certainly the canal can be built without attention to sanitation, but if the method followed up to the present time be continued it will cost thousands of lives, and, as the present epidemic in the southern states shows, it will, with greater or less frequency, extend to this country and involve greater or less areas.

An attempt to dig the Panama canal is like stirring up a nest of poisonous hornets, only that the comparison is a weak one. In this case the disturbed poisonous insects must get their poison from man and, having done this, they may pursue their foe even to the distant parts of the earth. Shall we continue to feebly whip the wasp's nest and drive the vicious insects abroad, or shall we wait until all are quietly in their house and then destroy them before they can do us harm? The former is the "strenuous," the latter the sensible way to do it. Very truly yours,

V. C. VAUGHAN.

A Stereoscopic Camera.

DENVER, COLO., Aug. 30, 1905.

To the Editor:—In making portraits of my patients for the purpose of keeping an accurate record of their condition, I have found it of great advantage to make use of a stereoscopic camera. As ordinarily furnished, these cameras are hardly satisfactory for the purpose, as the portrait is rather small to show details of many lesions.

I put on each lens a little portrait attachment sold by photo dealers; this enables me to come close to the subject, giving me a good-sized portrait; but in coming close the images are thrown almost off the plate; this is overcome by putting on the front of the lens carrier a brass sheet, in which a hole has been cut in front of the lenses, and over these holes I placed ten-degree-plane prisms with the bases out, thus bringing the images back on the plate. I make these portraits of such a size that they are just right for contact printing on to a lantern slide negative, in this way avoiding any need for enlarging or reducing before making slides.

I present this scheme, thinking it may be of use to your readers.

G. H. STOVER, M.D.

Association News

NEW MEMBERS.

List of new members of the American Medical Association for the month of August, 1905:

ALABAMA.
Howell, Wm. E., Haleyville.

ARIZONA.
Cowle, A. M., Kingman.
Rowell, H. J., Valverde.

ARKANSAS.
Howton, O., Osceola.

CALIFORNIA.
Jordan, Alfred B., Dale.
Z. Levin, San Francisco.
Swindt, Jos. K., Pomona.
Tully, J. J., Stockton.

COLORADO.
Auerbach, L., Denver.
Braden, J. M., Carbondale.
Christopher, D. I., Colo. Springs.
Krohn, H. N., Denver.
Prewitt, F. E., Denver.

GEORGIA.
Calhoun, A. T., Cartersville.
Darby, John I., Columbus.
Wahl, F., Savannah.

PHILIPPINE ISLANDS.
Biggar, J. H., Manila.

ILLINOIS.
Bressler, F. B., Chicago.
Brougham, E. J., Chicago.
Ehrmann, F. J. E., Chicago.
Frank M., Chicago.
Grim, U. J., Chicago.
Grimm, L. A., Chicago.
Heald, J. E., Peoria.
Hayes, P. B., Chicago.
Jamieson, J. K., Chicago.
Kaeser, A. F., Highland.
Lee, E. J., Valmeyer.
Lovewell, C. H., Chicago.
Laibe, F. J., Chicago.
Moore, F. D., Chicago.
McCnaig, W. J., Chicago.
Morris, R. W., Chicago.
Osher, J. C., Chicago.
Pugh, C. E., Chicago.
Panton, L. A. C., South Chicago.
Rullen, F. W., Joliet.
Ruthenberg, E. B., Chicago.
Stewe, H. M., Chicago.
Taylor, E. K. M., Le Roy.
Vorsanger, R., Chicago.
Westman, Carl, Chicago.
Windmueller, E., Woodstock.
Wangelline, H. E., Belleville.
Wilkinson, L., Chicago.
Zimmerman, H. S., Cameron.

INDIANA.
Brown, L. E., Ft. Wayne.
De Vaux, E. F., Ft. Wayne.
Layman, D. W., Indianapolis.
Stewart, J. W., Logansport.
Titus, Chas., Warrington.

INDIAN TERRITORY.
White, J. H., Muskogee.

IOWA.
Coplin, L. S. C., Harlan.
Krejsa, O., Cedar Rapids.
Linehan, C. M., Dubuque.
Lord, R., Hawarden.
Norman, W. G., Dow City.
Stanton, J. H., Chariton.

KANSAS.
Caswell, C. E., Wichita.
Leverich, L., Solomon.
Ross, H. R., Sterling.
Walker, O. D., Salina.

KENTUCKY.
Adams, Edw., Paducah.
Hibbitt, Chas. W., Louisville.

LOUISIANA.
Tucker, J. A., Baton Rouge.

MAINE.
Milliken, H. E., Waterville.

MASSACHUSETTS.
Chadwick, H. D., Waltham.
Hassett, J. J., Lee.
Strong, F. F., Boston.
Seymour, F. W., Boston.

MICHIGAN.
Busch, U. S. C., Jennings.
Barnett, G. G., Ishpeming.
Glenn, Thos. S., West Branch
Hooper, S. E., West Branch.
Kinsey, F. C., Three Rivers.
Millard, F. A., Detroit.
Roach, F. T., New Port.
Street, E. L., Wheeler.
Teeple, M. L., Sand Lake.
Brigham, G. S., St. Cloud.
Bennion, P. H., Merriam Park
Bissell, F. S., Maple Lake.
Brabec, F. J., Perham.
Gates, G. L., Winona.
McDougald, D. W., Minneapolis
MacDonald, A., Morristown.
Nootnagel, C. F., Minneapolis
Nickerson, B. S., Glencoe.

MONTANA.
Gilham. G. W., Townsend.

MISSOURI.
Clark, W. J., Maysville.
Carman, R. D., St. Louis.
Gaines, J. W., Kansas City.
Hamel, A. H., De Soto.
Lippe, M. J., St. Louis.
McKay, H. S., St. Louis.
Moore, W. G., St. Louis.
Yates, P. C., Neosho.

NEBRASKA.
Chapman, A. J., Hastings.
Dent, G. B., No. Platte.
Sadler, W. W., Bee.
Worthman, E. H. Louisville.

NEVADA.
Ascher, J. A., Sparks.
Moore, Wm. L., Verdi.

NEW HAMPSHIRE.
Lanouette, Jos. E., Manchester.
Wilkins, R., Concord.

NEW JERSEY.
Lamont, G. F. N., Newark.
McGuire, J. J., Trenton.
Newcomb, M. W., E. Orange.
Payne, Jos., Midland Park.
Riggins, E. N., E. Orange.
Warner, W. H. A., E. Orange.

NEW YORK.
Dearden, New York.
Fancher, E., Middletown.
Hyatt, H. W., White Plains.
Lavinder, C. H., Stapleton.
Ogden, J. B., New York.
Snyder, Thos., Niagara Falls.
Westerfield, —, New York.

NORTH CAROLINA.
Coble, W. A., Brick Church.
Hicks, C. S., Durham.

NORTH DAKOTA.
Guest, A. W., Jamestown.
Gibson, S. G., Langdon.
Rose, F. E., Fargo.
Stewart, Z. W., Grand Forks.

OHIO.
Baldwin, W. S., S. Lorain.
Barkhurst, S. O., Steubenville.
Brockway, R. B., Toledo.
Burdick, H. J., Cleveland.
Coldham, W. W., Toledo.
Cohen, A., Cleveland.
Dager, Wm. F., Lorain.
Dudley, S. B., Canton.

Drysdale, H. H., Cleveland.
Dabney, Wm. R., Marietta.
Earley, A. H., Dayton.
Flower, W. R., Ashtabula.
Hulse, J. A., Akron.
King, Wm. S., Ashtabula.
Kerr, Wm. E., Steubenville.
Lasalle, J. J., Toledo.
Madden, P. R., Xenia.
Marvin, A. H., Cleveland.
Mossgrove, Jas. R., Steubenville.
Riegelhaupt, S., Cleveland.
Smith, C. N., Toledo.
Sager, Jos., Celina.
Turrell, R. L., Conneaut.
Wilson, Dale, Toledo.
Young, T. C., Cleveland.

OKLAHOMA.

Hill, C. B., Guthrie.

OREGON.

Butler, O. D., Independence.
Gilbert, J. A., Portland.
King, A. E., Antelope.
McCorkle, M. G., Portland.
Skene, W. H., Portland.

PENNSYLVANIA.

Baker, M. H., Stoyestown.
Emery, W. H., Coatesville.
Fleming, A. B., Tamaqua.
Grim, G. M., Ottsville.
Greene, W. H., Philadelphia.
Marston, A. N., Belle Vernon.
Olson, G. M., Philadelphia.
Schaffner, B. W., Johnstown.

SOUTH DAKOTA.

Jenkins, P. B., Waubay.

TEXAS.

Burgess, J. L., Waco.
Lowe, F. M., Brownwood.
Westphal, Robt., Yorktown.

VIRGINIA.

Bryan, R. C., Richmond.
Cole, H. W., Jr., Norfolk.
Davidson, C. H., Lexington.
Stinson, L. R., Scottsville.

WASHINGTON.

Dodson, Z. T., Cleveland.
Fiset, L. O., Seattle.
Garnett, R. S., Tacoma.
Henden, Chas., Pl Ell.
Harrison, A. B., Seattle.
Johnston, W., Seattle.
Mitchell, D. A., Seattle.
Powers, W. N., Seattle.
Read, W. D., Tacoma.
Raymond, Alfred, Seattle.

WISCONSIN.

Evans, J. M., Evansville.
Hayes, C. A., Chippewa Falls.
Hayden, A., Shullsburg.
Montgomery, A., Eau Claire.
Mock, F. C., Milwaukee.
Phillips, C. E., Wilton.
Pronty, W. A., Burlington.

WYOMING.

Jewell, E. L., Lost Cabin.
Wyman, W. A., Cheyenne.

Marriages

JAMES G. ROSS, M.D., to Miss Lillian Henak, both of Chicago, August 23.

JAMES R. MONTGOMERY, M.D., to Miss Cora Knowles, both of Owensville, Ind., August 24.

EUGENE HAWKINS, M.D., to Miss Jessie E. Moore, both of Greencastle, Ind., August 23.

EDWARD B. COOPER, M.D., Sunbury, Pa., to Miss Anna Brand of Williamsport, Pa., August 22.

FRANK E. SHIMER, M.D., Jesup, Iowa, to Miss Tina Ashley of La Porte City, Iowa, August 30.

GEORGE W. FIFIELD, M.D., Janesville, Wis., to Miss Elizabeth Weidensall of Omaha, August 28.

HARRY O. SAPPINGTON, M.D., Galveston, Texas, to Miss Margaret G. Fay of Altoona, Pa., August 23.

JOSEPH P. SHEPPARD, M.D., to Miss Elizabeth Rutherford Denison, both of Little Rock, Ark., July 26.

JOSEPH EDGAR DIBBLE, M.D., Kansas City, Mo., to Miss Sallie M. Dismond of Kansas City, Kan., August 28.

ALBERT ATWOOD BLACKMAN, M.D., Colorado Springs, Colo., to Miss Gracia Russell of Chicago, September 2.

FRED C. BRECHAN, M.D., Phoenix, Ariz., to Miss Myrtle A. Ward, of Sioux City, Iowa, at Phoenix, August 25.

ROBERT FRANKLIN NIMOCKS, M.D., Gadsden, Ala., to Miss Mary Louise Chambers, of Poplarville, Miss., September 6.

HEINRICH LANGE, M.D., Germany, to Miss Eda Schwarz, of New York, at Govanstoun, near Baltimore, Md., August 24.

BRYAN DE FOREST SHEEDY, M.D., to Miss Eleanor Marie Connors, both of New York City, at Cambridge Springs, Pa., August 19.

Deaths

Philander J. Payne, M.D. College of Physicians and Surgeons, Keokuk, Iowa, 1861, of Keokuk, Iowa, assistant surgeon of the Tenth Missouri Volunteer Infantry in the Civil War; a charter member of the Tri-state Medical Society, a member of the Lee County and Iowa State medical societies, at one time a professor in the local medical college and one of the founders and directors of Graham Hospital, Keokuk, died at the home of his daughter in Nashville, Tenn., August 25, aged 65.

Smith **Austin Skinner, M.D.** University of Vermont Medical Department, Burlington, 1854, assistant surgeon of the Seventh Vermont Volunteer Infantry in the Civil War, a charter member of the New York State Medical Association, a member of the Rensselaer County Medical Society and for several years president of the Union Medical Society; for 8 years health officer of Hoosick Falls, N. Y., died suddenly at his home in that city, August 15, from heart disease, aged 81.

Adolph Schlossstein, M.D. University of Würzburg, Germany, 1865, a member of the American Medical Association, surgeon in the German army in 1866, a prominent practitioner of St. Louis, died at his home in that city August 27, from cerebral hemorrhage, after an illness of two weeks, aged 64. The Society of German Physicians and the St. Louis Medical Society sent delegations to represent them at the funeral.

Erwin Wendell Woodford, M.D. College of Physicians and Surgeons of Chicago, 1900, a member of the American Medical Association, a well-known physician of the West Side, Cleveland, died at the Lutheran Hospital, Cleveland, August 15, from typhoid fever, after an illness of twelve days, aged 63.

Henry H. Hawn, M.D. Long Island College Hospital, Brooklyn, N. Y., 1876, coroner for several years of Mahoning County, Ohio; president of the medical staff of the Youngstown City Hospital, died at his country home near Youngstown, August 28, from hepatic disease, after a long illness, aged 59.

George C. Porter, M.D. Jefferson Medical College, Philadelphia, 1890, a member of the American Medical Association, and a prominent physician of San Benito County, Cal., died at his home in Hollister, August 25, after an illness of several months, aged 52.

J. Franklin Ford, M.D. Rush Medical College, Chicago, 1887, some-time president of the Fox River Valley Medical Society and president of the village board, died at his home in Omro, Wis., from diabetes, August 28, after a prolonged illness, aged 50.

George Arthur Torgler, M.D. University of the State of Oregon, Medical Department, Portland, 1904, of Portland, died at the Open-Air Sanitarium, Portland, August 16, from heart disease, after an illness of three weeks, aged 26.

Hiram C. Vaughan, M.D. Harvard University Medical School, Boston, acting assistant surgeon in the Navy during the Civil War, who retired from practice in 1867, died at his home in Foxcroft, Maine, August 19.

Philip A. Knight, M.D. University of Michigan Department of Medicine and Surgery, Ann Arbor, 1854, for many years secretary of the school board of Utica, Mich., died at his home in that place, August 30, aged 77.

Lewis Wolverton, M.D. Jefferson Medical College, Philadelphia, 1883, who had long been addicted to liquor and drug habits, was found dead from asphyxiation in his apartments in Shamokin, Pa., August 13, aged 48.

Luther E. Stowell, M.D. Rush Medical College, Chicago, 1900, of Williamsfield, Ill., a member of the Knox County Medical Society, died in Peoria, August 26, after a long ilness, aged 30.

Walter A. Corson, M.D. Pennsylvania, collector of customs, 1844, at El Paso, Texas, died in that city, August 21, from consumption, after an illness of several years, aged 33.

Richard M. Davis, M.D Willamette University Medical Department, Salem, Ore., 1878, died at his home in Seattle, Wash., August 17, from nephritis, after a long illness.

J. Thomas Musick, M.D. Tulane University of Louisiana, New Orleans, 1869, died at his home in Pittsburg, Texas, August 24, after an illness of several years, aged 59.

John E. Davis, M.D. University of Louisville Medical Department, 1869, of Lowell, Ind., died at a hospital in Chicago, August 25, after an operation on the kidney, aged 61.

Albert Isaacson, M.D. (Examination Kansas), died at his home in McPherson, Kan., from congestion of the brain, August 20, after an illness of a few hours, aged 31.

William R. Owen, M.D. College of Physicians and Surgeons of Chicago, 1889, of Sublette, Ill., shot and killed himself in a church in Minneapolis, August 27, aged about 60.

Harry Sparks Wheeler, M.D. Department of Medicine of the University of Pennsylvania, Philadelphia, 1895, of Niles, Ohio, died recently in a sanitarium near Pittsburg.

John Ross Smith, M.D. Cincinnati, 1872, died suddenly at his home in Kellogg, Iowa, August 17, from sunstroke, after an illness of only a few hours, aged 60.

Seth D. Smith, M.D. University of Louisville Medical Department, 1854, died at his home in Demopolis, Ala., August 21, after a prolonged illness, aged 74.

Horde Sharp, M.D. University of Louisville Medical Department, 1872, died suddenly from heart disease at his home in Sharpsburg, Ky., August 19, aged 58.

Littleton Thompson, M.D. Cincinnati College of Medicine and Surgery, 1884, died at his home in Utica, Ill., August 19, after an illness of 4 weeks, aged 55.

Ernest Pierpont, M.D. Chicago Medical College, 1880, an old resident of the Ojal Valley, Cal., died at his home, Overlook, Nordhoff, August 26, aged 50.

John Van Dermark, M.D. Illinois, 1883, died at his home in Rosendale, N. Y., August 24, from typhoid fever, after an illness of one week, aged 57.

Henry F. Garey, M.D. Washington University School of Medicine, Baltimore, 1876, **of Kansas City, Mo., died** at Baltimore, August 31, from nephritis.

John J. Lawrence, M.D. New York University, New York City, 1861, died at his home near Coakley, N. C., from dropsy, August 21, aged 68.

J. Y. Hicks, M.D. Tulane University of Louisiana, New Orleans, 1852, died at his home in Moulton, Texas, aged 23.

Abroad.

Christopher Heath, F.R.C.S. Death has suddenly removed one of the most prominent of London surgeons and teachers, Mr. Christopher Heath. Born in London in 1835, he was the grandson of Mr. John Heath, a surgeon in the Royal Navy, was educated at King's College School and Hospital, receiving his M.R.C.S. degree in 1856. He served as a surgeon with the Baltic fleet in the Crimean war. In 1856 he was appointed demonstrator of anatomy at Westminster Hospital and in 1862 lecturer on anatomy and assistant surgeon. In 1866 he became assistant surgeon and teacher of operative surgery at University College Hospital, and in 1875 he was made surgeon and professor of surgery. While at the Westminister Hospital he wrote his well-known "Practical Anatomy," which reached a ninth edition in 1902. A year after his appointment to University College Hospital he was awarded the Jacksonian prize for his essay on "The Injuries and Diseases of the Jaws, Including Those of the Antrum with the Treatment by Operation or Otherwise." In 1881 he was elected a member of the Council of the Royal College of Surgeons, and in 1895 president. He was an admirable teacher, being always clear and practical, as many popular works which emanated from his pen show. Among the best known are his "Course of Operative Surgery," and his "Manual of Minor Surgery and Bandaging," which ran into twelve editions. He also edited his standard "Dictionary of Practical Surgery." In 1897 he delivered the Lane Medical Lectures at the Cooper Medical College in San Francisco, which were listened to with great attention, not only by the students, but by hundreds of practitioners from the Pacific coast. A pupil of Sir William Ferguson, Mr. Heath was a bold and successful operator. As an authority on the surgical diseases of the jaws he was foremost. He was a keen controversialist and a hard hitter. He died suddenly at his residence in London, August 8, aged 70.

Queries and Minor Notes

ANONYMOUS COMMUNICATIONS will not be noticed. Queries for this column must be accompanied by the writer's name and address, but the request of the writer not to publish name or address will be faithfully observed.

DETERIORATION OF APOMORPHIN HYDROCHLORATE.

DODGE CITY, Kansas, Aug. 22, 1905.

To the Editor:—Anent your observation on apomorphin, in reply to an inquirer in THE JOURNAL of August 19, page 548, I beg to say that H. C. Wood, in the tenth edition of his work on "Therapeutics," merely mentioned the discolorations, as also does H. H. Rusby in his article on the drug in Wood's "Reference Handbook." Gould's "Students' Dictionary" does not mention it, but Lippincott's "Medical Dictionary"—late revision—condemns the use of the discolored material.

Some four years ago I had occasion to use apomorphin in a case of acute alcoholism, and injected the discolored tablets with good results. I stuck the tube in my pocket hypo and had no occasion to use it again till last week, when, on responding to a hurry call, I found a man who had swallowed a half-ounce of laudanum, and was already profoundly under the influence. My heart misgave me when I pulled out that old green tube; it was clear that the man could not be made to swallow anything, and that a stomach-tube was a useless piece of furniture. To have gone to the drug store to search for a tube of fresh tablets would have consumed valuable time; so I hurriedly injected 1/6 gr. of the discolored drug into the patient's arm without waiting for any sort of cleansing, and in about three minutes he was giving a lively exhibition of reverse peristalsis of the stomach to the delight of a highly interested audience and doubly to the relief of the attending physician. No untoward symptoms developed.

Since reading your condemnation of the discolored article, I have replaced my green tablets with white ones in a brown tube; although I can not avoid the suspicion, on account of the favorable result above described, that I have allowed myself to be euchred out of my fifteen cents. W. H. GRAVES.

PRODUCTION OF SYNTHETIC PROTEIDS.

NUTLEY, N. J., Aug. 22, 1905.

To the Editor:—Is there, in English, any volume embodying the work of L. v. Fisher and others in the laboratory production of synthetic proteids? Where can I obtain information as to these, their variety and character and methods of production? Haeckel says: "Chemists have hitherto tried in vain to master the chemical structure of these obscure protein compounds," meaning, particularly, the various albumins. Are any of these included with some sugars and urea, etc., as laboratory products? JOSEPH CLEMENTS.

ANSWER.—Details concerning the synthetic preparation of proteid-like substances, involving principles and methods discovered by Kossel, Curtius, Fischer and others, are not described in English books on chemistry. The chemistry of proteids, insofar as it is understood to-day, is treated of in Otto Cohnheim's "Chemie der Eiweisskörper," a second edition of which has appeared recently. Unfortunately, this is not translated into English.

TEST FOR URIC ACID.

HOUSTON, TEXAS, Aug. 26, 1905.

To the Editor:—Please give me a quick and easy method for estimating the percentage of uric acid in urine. W. A. H.

ANSWER.—A very convenient and fairly exact method is the one in which Ruhemann's uricometer is used. The tube is filled up to certain marks with carbon disulphid, and then with a solution containing iodin 1.5 grams, potassium iodid 1.5 grams and absolute alcohol 15 grams in 185 c.c. of distilled water. On adding a certain amount of urine and shaking, the carbon disulphid will become of a dark brown copper color; with more urine the carbon disulphid will absorb all free iodin and the mixture will look like urine. The adding of urine should be stopped as soon as the carbon disulphid shows only a slight reddish tint, because this will disappear entirely after repeated shakings. The test is finished when the indicator appears snow-white, a sign that all iodin has been neutralized by the urine. After the foam has settled, the proportion of uric acid is read off on the scale.

ACONITIN.

ASHTON, S. DAK., Aug. 28, 1905.

To the Editor:—A number of text-books state that aconitin should not be used internally, yet at the same time stating that it has the same physiologic action as aconite. Will you state why it should not be used, if it should not be? Has it the same physiologic action as aconite? Are there reliable preparations for internal use to be had? J. M. CRABB.

ANSWER.—Aconitin is used internally. It is the most potent of all vegetable alkaloids. In the U. S. Pharmacopeia (8th dec. rev.) the dose is given as 1/400 gr. (0.00015). It has practically the same action as aconite, but must be used cautiously and in minute doses.

State Boards of Registration

COMING EXAMINATIONS.

Massachusetts Board of Registration in Medicine, State House Boston, September 12-13. Secretary, E. B. Harvey, Boston.

Central District Indian Territory Board of Medical Examiners, South McAlester, October 2. Secretary, W. B. Caldwell, Hugo.

Utah State Board of Medical Examiners, Salt Lake City, October 2. Secretary, R. W. Fisher, Salt Lake City.

Board of Medical Examiners of Arizona, Phoenix, October 2-3. Secretary, A. Martin, Phoenix.

Idaho State Board of Medical Examiners, Boise, October 3. Secretary, J. L. Conant, Jr., Genesee.

Indiana Board of Medical Registration and Examination, State House, Indianapolis, October 3. Secretary, W. T. Gott, Crawfordsville.

Board of Medical Examiners of Montana, The Capitol, Helena, October 3. Secretary, W. C. Riddell, Helena.

North Dakota State Medical Examining Board, Grand Forks, October 3. Secretary, H. M. Wheeler, Grand Forks.

Minnesota State Board of Medical Examiners, Old Capitol Building, St. Paul, October 3-5. Secretary, C. J. Ringnell, Minneapolis.

Rhode Island State Board of Health, State House, Providence, October 5-6. Secretary, G. T. Swarts, Providence.

Regular Board of Medical Examiners of Georgia, The Capitol, Atlanta, October 9. Secretary, F. D. Paterson, Cuthbert.

Michigan State Board of Registration in Medicine, Capitol Building, Lansing, October 10. Secretary, B. D. Harison, Sault Ste. Marie.

State Medical Board of the Arkansas Medical Society, Little Rock, October 10. Secretary, J. P. Runyan, Little Rock.

State Board of Medical Registration of Vermont, Y. M. C. A. Hall, Burlington, October 10-12. Secretary, W. S. Naya, Underhill.

Kansas State Board of Medical Registration and Examination, State House, Topeka, October 10-11. Secretary, G. F. Johnston, Lakin.

Board of Medical Supervisors of Washington, D. C., Washington, D. C., October 12. Secretary, W. C. Woodward, Washington, D. C.

Board of Medical Examiners of State of Texas, San Antonio, October 17. Secretary, T. T. Jackson, San Antonio.

State Board of Medical Examiners of New Jersey, Trenton, October 17-18. Secretary, E. L. B. Godfrey, Camden.
State Board of Health of Illinois, The Great Northern Hotel, Chicago, October 18. Secretary, J. A. Eagan, Springfield.
Louisiana State Board, New Orleans, October 20-21. Secretary, F. A. Larue, New Orleans.

Arizona July Report.—Dr. Ancil Martin, secretary of the Board of Medical Examiners of Arizona, reports the written examination held at Phoenix, July 4-5, 1905. The number of subjects examined in was 9; total number of questions asked, 90; percentage required to pass, 75. The total number of candidates examined was 8, all of whom passed.

PASSED.

College.	Year Grad.	Per Cent.
Columbus Med. Coll.	(1882)	77.2
University of Michigan	(1904)	88
McGill University	(1904)	77.4
Washington University	(1905)	83
Medico Chirurgical Coll., Philadelphia	(1905)	92
Vanderbilt University	(1899)	75.7
Yale University	(1903)	81
Northwestern University	(1904)	76

The Public Service

Army Changes.

Memorandum of changes of stations and duties of medical officers, U. S. Army, week ending September 2, 1905:

Shook, Jay R., asst.-surgeon, left Fort Des Moines, Iowa, with Troop "G," 11th Cavalry, to Terre Haute, Ind., and return.

Billingslea, C. C., asst.-surgeon, reported for temporary duty at Fort D. A. Russell, Wyo., from Fort Riley, Kans.

Siler, Joseph F., asst.-surgeon, left Fort Meade, S. Dakota, with 6th Cavalry on field duty.

Bourke, James, asst.-surgeon, granted two months and twenty-eight days' leave of absencce when his services can be spared, with permission to go beyond the sea.

Baker, Frank C., asst.-surgeon, ordered, on completion of competition at Sea Girt, N. J., to return to his proper station, Presidio of Monterey, Cal.

Quinton, W. W., asst.-surgeon, left Fort McPherson, Ga., en route to Fort Barrancas, Fla., on detached duty.

Bernheim, J. R., dental surgeon, left San Francisco, Cal., en route to Fort Slocum, N. Y., for duty.

Coffey, A. McD., contract surgeon, left Fort Lawton, Wash., and arrived at Fort Davis, Alaska, for duty.

Byars, C. R., contract surgeon, left Fort Sam Houston, Tex., and arrived at Fort Sill, Okla. Ter., for temporary duty with Provisional Regiment of Field Artillery.

Halliday, Francis A., contract surgeon, relieved from temporary duty at Fort Caswell, N. C., and further duty at Fort McPherson, Ga., and ordered to Fort Fremont, S. C., for duty.

Navy Changes.

Changes in the Medical Corps, U. S. Navy, for the week ending September 2, 1905.

McCormick, A. M. D., surgeon, detached from the *Hartford* and ordered home to wait orders.

Brister, J. M., P. A. surgeon, detached from the *Atlanta* and ordered home to wait orders.

Riggs, R. E., asst.-surgeon, detached from the *Newark* and ordered home to wait orders.

Byrnes, J. C., surgeon, detached from the *Texas* and ordered to the Naval Academy.

Freeman, G. F., P. A. surgeon, detached from the Naval Station, Olongapo, P. I., and ordered to the Naval Station, Cavite, P. I.

Taylor, J. S., P. A. surgeon, detached from the *Ohio* and ordered to duty at the United States legation, Pekin, China.

Wickes, G. L., asst.-surgeon, detached from the Naval Station, Cavite, P. I., and ordered to the *Ohio*.

Pryor, J. C., surgeon, ordered to the Naval Medical School, Washington, D. C.

Dunn, H. A., P. A. surgeon, detached from the *Terror* and ordered home to wait orders.

Hathaway, G. S., asst.-surgeon, ordered to the Naval Hospital, Washington, D. C.

Geiger, A. J., asst.-surgeon, detached from the *Severn*, granted leave for thirty days, and then to wait orders.

Public Health and Marine-Hospital Service.

List of changes of station and duties of commissioned and non-commissioned officers of the Public Health and Marine-Hospital Service for the seven days ending Aug. 30, 1905:

Sawtelle, H. W., surgeon, to proceed to Richmond, Va., for special temporary duty.

Magruder, G. M., surgeon, granted leave of absence for one month from Aug. 26, 1905, on account of sickness.

Gardner, C. H., P. A. surgeon, to proceed to New Orleans, La., and report to Surgeon J. H. White for special temporary duty.

Foster, M. H., P. A. surgeon, to proceed to Galveston, Texas, and assume temporary command of the service.

Stiles, Ch. W., Chief, Division of Zoology, granted leave of absence for twelve days from Aug. 14, 1905.

Hunt, Reid, Chief, Division of Pharmacology, granted leave of absence for ten days from Aug. 21, 1905.

Hunt, Reid, Chief, Division of Pharmacology, to represent service at meeting of American Pharmaceutical Association at Atlantic City, N. J., September 4-9, 1905.

Richardson, N. D., acting asst.-surgeon, granted leave of absence for seven days from Aug. 17, 1905.

Stevenson, J. W., acting asst.-surgeon, to report at Washington, D. C., for special temporary duty.

Thompson, C. V., acting asst.-surgeon, granted leave of absence for sixteen days from Sept. 2, 1905.

Richardson, S. W., pharmacist, to report at Washington, D. C., for special temporary duty.

McKay, M., pharmacist, relieved from duty at Boston, Mass., and directed to proceed to Cincinnati, Ohio, and report to acting asst.-surgeon in charge for duty and assignment to quarters.

Woods, C. H., pharmacist, on being relieved from duty at Cincinnati, Ohio, to proceed to Evansville, Ind., and report to medical officer in command for duty and assignment to quarters, relieving Pharmacist G. I. Van Ness, Jr.

Carlton, C. G., pharmacist, granted leave of absence for seven days from Aug. 22, 1905.

Van Ness, G. I., pharmacist, leave of absence for thirty days from Aug. 1, 1905, granted Pharmacist Van Ness by Department letter of July 19, 1905, amended so that said leave shall be for nineteen days only.

Van Ness, G. I., Jr., pharmacist, on being relieved from duty at Evansville, Ind., by Pharmacist C. H. Woods, to report at Washington, D. C., for duty.

Health Reports.

The following cases of smallpox, yellow fever, cholera and plague have been reported to the Surgeon-General Public Health and Marine-Hospital Service, during the week ended August 19, 1905:

SMALLPOX—UNITED STATES.

Arkansas: Fort Smith, May 20-June 3, 2 cases.
California: Los Angeles, August 5-12, 5 cases; San Francisco, August 12-19, 2 cases.
District of Columbia: Washington, August 12-19, 2 cases.
Florida: Jacksonville, August 12-19, 1 case.
Illinois: Chicago, August 12-19, 2 cases, 2 deaths.
Louisiana: New Orleans, August 12-19, 1 case, imported.
Massachusetts: Lowell, August 12-19, 1 case.
Ohio: Canton, March 1-April 2, 1 case.
Wisconsin: Appleton, August 11-18, 4 cases; Milwaukee, July 30-August 12, 2 cases.

SMALLPOX—INSULAR.

Philippine Islands: Manila, June 17-24, 1 case.

SMALLPOX—FOREIGN.

Africa: Cape Town, July 8-15, 5 cases.
Brazil: Bahia, July 15-22, 1 death; Rio de Janeiro, July 16-23, 21 cases, 1 death; Rio Grande de Sul, July 11, epidemic.
France: Paris, August 4-11, 17 cases, 7 deaths.
Great Britain: Cardiff, Aug. 6-12, 2 cases; Newcastle-on-Tyne, July 29-August 5, 1 case.
India: Bombay, July 11-25, 1 death; Calcutta, July 15-22, 2 deaths; Karachi, July 15-23, 1 case, 1 death; Madras, July 8-21, 8 deaths.
Mexico: City of Mexico, July 15-August 12, 23 cases, 18 deaths.
Panama: Bocas del Toro, July 22-28, 1 case.
Russia: Odessa, July 30-August 5, 9 cases, 2 deaths; St. Petersburg, July 15-29, 5 cases, 3 deaths.
Spain: Barcelona, July 21-August 10, 7 deaths.
Turkey: Constantinople, July 23-August 6, 7 deaths.

YELLOW FEVER—UNITED STATES.

Louisiana: Ascension Parish, to August 14, 1 case, 1 death; Avoyelles Parish, 1 case, 1 death; Caddo Parish, 4 cases; Calcasieu Parish, 3 cases, 2 deaths; East Carroll Parish, 1 case, 1 death; Iberville Parish, 1 case, 1 death; Jefferson Parish, 5 cases, 5 deaths; Lafourche Parish, 3 cases, 1 death; Madison Parish, 2 cases, 1 death; Orleans Parish, July 21-Aug. 17, 1,129 cases, 165 deaths; Plaquemines Parish, to August 14, 11 cases, 2 deaths; Rapides Parish, 2 cases; St. Charles Parish, to August 15, about 18 cases, 3 deaths; St. James Parish, 1 case; St. John Parish, to Aug. 14, about 12 cases, 2 deaths; St. Mary Parish, 48 cases, 3 deaths; Terrebonne Parish, 2 cases, 1 death.

YELLOW FEVER—FOREIGN.

Mississippi: Mississippi City, to August 17, 10 cases.
Brazil: Rio de Janeiro, July 16-23, 20 cases, 7 deaths.
Guatemala: Livingston, July 22-August 5, 4 deaths; Zacapa, August 5, present.
Honduras: Chamelicon, August 10, present; Choloma, present; Puerto Cortez, July 22-28, 2 cases, Aug. 3-10, 1 death.
Mexico: Tierra Blanca, Aug. 6-12, 2 cases, 1 death; Vera Cruz, 6 cases, 3 deaths.

CHOLERA.

India: Bombay, July 11-25, 2 deaths; Calcutta, July 15-22, 14 deaths; Madras, July 7-21, 33 cases.

PLAGUE—INSULAR.

Philippine Islands: Manila, June 17-24, 2 cases, 2 deaths: Cebu, 2 cases, 2 deaths.

PLAGUE—FOREIGN.

China: Hongkong, June 3-17, 47 cases, 47 deaths.
India: Bombay, July 11-25, 84 deaths; Calcutta, July 15-22, 10 deaths; Karachi, July 8-23, 18 cases, 15 deaths.

Society Proceedings

COMING MEETINGS.

Academy of Ophthalmology and Oto-Laryngology, Buffalo, September 14-16.

American Academy of Ophthalmology and Oto-Laryngology, Buffalo, September 14-16.

American Electro-Therapeutic Association, New York City, September 19-21.

American Association of Obstetricians and Gynecologists, New York City, September 19-21.

American Public Health Association, Boston, September 25-29.

Medical Society of the State of Pennsylvania, Scranton, September 26-28.

Association of Military Surgeons of the United States, Detroit, September 26-28.
Wyoming State Medical Society, Cheyenne, September 27-28.
American Roentgen Ray Society, Baltimore, September 28-30.
Mississippi Valley Medical Association, Indianapolis, October 10-12.
New York State Medical Association, New York City, October 16-19.
American Academy of Medicine, Chicago, November 7-8.
American Dermatologic Association, New York City, December 28-30.

Therapeutics

[It is the aim of this department to aid the general practitioner by giving practical prescriptions and, in brief, methods of treatment for the diseases seen especially in every-day practice. Proper inquiries concerning general formulae and outlines of treatment are answered in these columns.]

The Reduction of Fever.

QUININ.

Aside from the hydrotherapeutic measures in the reduction of temperature Shoemaker, in *Med. Bull.*, regards quinin as the most effective agent in reducing temperature and that in periodical fevers, he states, it is a specific. It limits tissue change, checks fermentation, prevents putrefaction and inhibits the activity of infective germs and thus limits the production of heat. He does not advise it given in enormous doses, for in such large doses it is a gastrointestinal irritant and is injurious to Peyer's patches. He, therefore, recommends it in moderate doses as a tonic and as a reducer of temperature. In epidemic influenza it is of decided value. It counteracts the fever, sustains the strength, allays the cough, and is particularly valuable when the disease is complicated by bronchopneumonia. The fever of croupous pneumonia is likewise favorably influenced. In scarlatina and erysipelas this drug is one of the chief reliances.

SALICYLIC ACID.

Salicylic acid is of use in a number of febrile affections and especially in acute inflammatory rheumatism. Its purest form is obtained in oil of gaultheria. According to this author, salicylic acid is inferior to quinin in the reduction of fevers not of rheumatic origin, and in rheumatism it is surpassed by oil of gaultheria and salicin.

As a remedy for colds and rheumatic pains an infusion made from the leaves of the wintergreen is recommended. The pure oil is effective in doses ranging from 2 to 20 minims (.12 to 1.30). It possesses both antiseptic and antipyretic properties and quickly relieves pain of rheumatic origin when given in full doses every two hours in milk or enclosed in capsules. Its physiologic action is the same as that of salicylic acid and its toxic effects are much less than that of the artificial acid.

In scarlatina the author states that the oil of wintergreen forestalls the occurrence of arthritic complications which are liable to develop in this disease. It may be applied locally combined as follows:

℞. Olei gaultheriæ
Olei olivæ, āā.....3iv 15|
M. Sig.: Apply locally to the affected joints.

SALICIN.

Salicin, which is a principle akin to the salicylates and derived from the willow and poplar, is better borne by the stomach than either salicylic acid or the oil of gaultheria. It does not depress the heart, but, on the other hand, serves as a tonic. It can be given safely in doses of several drams daily, the usual dose being 10 grains (.65) every two or three hours. It should be given every hour until three or four doses have been given. It is of value in both the acute and chronic forms of rheumatism, also in the treatment of influenza. A combination of salicin and quinin is a good one in such cases. Salicin is also valuable in tuberculosis to subdue the hectic fever and to check the toxic diarrhea. It also improves the appetite and increases the digestive powers. In pelvic inflammations accompanied by febrile reaction, as in cases of salpingitis, oöphorites, metritis and peritonitis, it is valuable. In the rheumatic fevers of children it is especially to be recommended, as it is easily borne by them. It promotes more rapid convalescence and never produces delirium.

ALCOHOL.

Alcohol has some effect in reducing fever by diminishing tissue change and promoting heat radiation. It is not, however, given primarily to reduce temperature, but it is of value when fever is present, in some cases to quiet delirium and to promote sleep. Its administration, therefore, should depend on the condition of the patient. The malt liquors are frequently given during the stage of convalescence from fevers. In hemorrhagic measles or scarlatina, diphtheria and pneumonia, alcohol is demanded, and it is frequently of service in the treatment of erysipelas.

CAMPHOR.

Camphor, like alcohol, stimulates the heart and circulation in low fevers. It diminishes the production of heat and lessens tissue waste. It is of more benefit when given in small doses, as large quantities depress. Its virtue is too often overlooked, so states the author, while there is such a strong tendency at the present time to experiment with new drugs. This drug overcomes restlessness and excitement caused by high temperature. It is of value in typhoid fever and typhoid pneumonia, especially in aged individuals. It is also of value in the eruptive fevers and influenza.

ACONITE.

Aconite reduces fever by its effect on the circulation. It diminishes the action of the heart, decreases the frequency of the pulse rate and lowers blood pressure. It also promotes elimination by the skin and kidneys. It is of value, therefore, in the treatment of sthenic fevers, which not infrequently are seen in robust individuals. In typhoid fever it is of no service. In the eruptive fevers of childhood it produces good effect, also in acute inflammatory conditions, in pleurisy, pneumonia, pericarditis, endocarditis and tonsillitis, by promoting the elimination and reducing the temperature.

VERATRUM VIRIDE.

Veratrum viride allays the overactivity of the heart and reduces the tension of the pulse. It should not be prescribed in large doses, as they cause nausea and vomiting and sometimes are followed by collapse. It is contraindicated in typhoid fever unless violent delirium and a high tensioned pulse is present. In the beginning of the first stage of pneumonia it is very valuable. It may be given in from 10 to 15 minim (.65-1.00) doses of the tincture every two hours to reduce temperature and pulse rate. It is harmful in the second stage of pneumonia.

GELSEMIUM.

Gelsemium is another preparation which lowers the pulse rate and decreases arterial tension. It acts on the ganglia of the heart. This preparation also increases the activity of the skin and reduces fever. It should be given only in fevers of the sthenic type to allay the cerebral excitement, congestion and inflammation. It is sometimes recommended for this purpose in allaying the cerebral excitement, congestion and inflammation present in cerebrospinal meningitis. It is more serviceable in diseases of children. It is recommended by the author in beginning pneumonia and pleurisy and in remittent fever.

ANTIMONY.

Antimony acts by depressing the heart's action and is a diaphoretic. Tartar emetic is of value in acute bronchitis by reducing temperature and promoting secretion by the mucous membrane. It is very valuable in the treatment of tonsillitis and parotiditis. The coaltar products are mentioned by the author only to be condemned as a class of agents which produce grave influences on the heart and circulation in general. They depress the nervous system and in some cases produce collapse, cyanosis, dyspnea, vertigo and vomiting.

Corns.

Brocq, in an abstract in *Med. News*, recommends that the corn be softened at night with a piece of flannel covered with soap and spirits, followed by curetting it with a curette or a knife. Apply daily for six or eight days the following dressing:

℞ Ext. cannabis ind. alc.....gr. viiss | 50
Acidi salicylici .....gr. xv | 1
Alcoholis .....m. xv | 1
Spts. etheris .....℥ss | 2
Collodii (flexible) .....℥iss | 6

M. Sig.: Apply locally once a day.

After the foregoing dressing has been applied for the required number of times the foot should be bathed in hot water and the corn curetted. Other methods consist in moistening the corn with a concentrated solution of salicylic acid in alcohol, covering it with pulverized salicylic acid and sealing with a piece of cotton. The dressing should be renewed in four or five days, and if inflammation is present the treatment should be stopped. About the eighth day the foot should be soaked in hot water and the corn can then be removed.

The following combination is regarded as valuable in the removal of corns:

℞ Acidi salicylici .....gr. xl | 2 | 65
Ext. cannabis ind.....gr. v | | 30
Collodii flex. q. s. ad.....℥i | 30

M. Sig.: To be painted over the corn once or twice daily for several days. Or:

℞ Ext. cannabis ind.....gr. iii | | 20
Acidi salicylici .....℥ss | 2 |
Olei terebinthinæ.....m. xv | 1 |
Acidi acetici glacial.....m. vi | | 40
Cocainæ (alk.) .....gr. vi | | 40
Collodii q. s. ad.....℥v | 20 |

M. Sig.: Apply a thin coating over corn every night until it drops off. Or:

℞ Acidi salicylici .....gr. x | | 65
Ext. cannabis ind.....gr. iv | | 25
Alcoholis
Etheris, āā .....℥ss | 2 |
Collodii .....℥iii | 12 |

M. Sig.: Apply locally. Or:

℞ Potass. hydratis .....gr. iii | | 20
Tinct. iodi .....℥i | 4 |
Glycerini .....℥ss | 15 |
Aquæ destil .....℥i | 30 |

M. Sig.: Apply to the corn morning and night with a camel's hair brush.

Cystitis.

The following combination is recommended in the treatment of cystitis:

℞ Salol .....℥ii | 8 |
Pulv. acaciæ q. s.
Aquæ cinnamomi .....℥xii | 360 |

M. Ft. mistura. Sig.: One tablespoonful four times a day.

A suppository is sometimes necessary to relieve the accompanying pain:

℞ Pulv. opii.....gr. iv | | 25
Ext. hyoscyami.....gr. vi | | 40
Ol. theobromæ q. s. | |

M. Ft. sup. No. vi. Sig.: One suppository two or three times a day, if necessary, to relieve the pain.

Medicolegal

Privileged Communications.

Section 3163 of the Code of Civil Procedure of Montana, among other things, provides: "There are particular relations in which it is the policy of the law to encourage confidence and to preserve it inviolate; therefore, a person can not be examined as a witness in the following cases: . . . (4) A licensed physician or surgeon can not, without the consent of his patient, be examined in a civil action as to any information acquired in attending the patient which was necessary to enable him to prescribe or act for the patient." Most of the states in the union, if not all, the Supreme Court of Montana says, in the personal injury case of May vs. Northern Pacific Railway Co., have similar statutory provisions.

In the case before the court the plaintiff on her direct examination merely described her injury, and told of her treatment by two physicians. On cross-examination she admitted that a third physician had also attended her as her physician, and had treated her for the injury complained of; but she did not assume to detail any conversation had with him, or to tell of the character or extent of the treatment which he gave her. The defendant insisted that this physician should have been permitted to testify as to the condition of the plaintiff at the time he attended her as her physician. But the court does not think so.

Of course, says the court, if the patient calls the physician as a witness to testify, he thereby expressly consents to the proceeding, or, if he sits by and fails to object, he tacitly consents that the physician may testify. Furthermore, it has been held that where the patient directly attacks the physician, as by an action for damages for malpractice, he abandons the protection given by the statute, for he thereby challenges the physician to disprove the patient's contention as to the character of his injury or of the physician's treatment. Lane vs. Boicourt, 128 Ind. 420. It has also been held that where two or more physicians are employed at the same time, with respect to information gained at the same consultation, calling one of the physicians as a witness by the patient constitutes a waiver of the statutory prohibition as to the other or others (Morris vs. Railway Co., 148 N. Y. 88), although this doctrine is disputed by respectable authority (Baxter vs. Cedar Rapids, 103 Iowa, 599). Likewise it has been held that, where the patient calls the physician as a witness at one trial, this constitutes a waiver of the privileges as to that physician on a second trial of the same case. McKinney vs. Railroad Co., 104 N. Y. 352. But this doctrine has also been disputed in Burgess vs. Sims Drug Co., 114 Iowa, 275, and Grattan vs. Insurance Co., 92 N. Y. 274.

But so far as this court's investigation discloses, no court of last resort has ever held that the mere fact that the patient testifies generally concerning his condition constitutes a waiver of the privilege granted by the statute. In Marx vs. Railroad Co., 10 N. Y. Supp. 159, the Supreme Court of New York held that, where the patient assumes to tell all that took place between himself and the physician, this constitutes a waiver of the privilege; and in Treanor vs. Railroad Co., 16 N. Y. Supp. 536, decided by the Common Pleas Court of New York City, it was also held that, where the patient testifies without reservation as to his injuries and their effect on him, this likewise constitutes a waiver of the privilege. But these cases were later disapproved, and in effect directly overruled, by the Supreme Court of New York in Fox vs. Turnpike Co., 69 N. Y. Supp. 551, and Dunckle vs. McAllister, 74 N. Y. Supp. 902, and by the Court of Appeals of New York in Morris vs. Railway Co., above cited. In Highfill vs. Railroad Co., 93 Mo. App. 219, it is said that, where a patient goes on the stand and testifies as to what his physician found and said, he thereby waives the privilege under the statute. It may be safely said that the Missouri Appellate Court is now the only court asserting the doctrine announced by it, and even that case can hardly be a precedent in favor of the contention of the defendant here, for this plaintiff did not assume to tell what the third physician mentioned had done for her, or to detail any conversations with him, and her statement that he had been her physician was not a voluntary one, but was brought out on cross-examination.

It is not the inherent incompetency of the evidence that precludes it being given, but it is the fact that the evidence comes from a person who occupies a certain relation of confidence to the patient, by virtue of which the statute says he shall not disclose his information without the consent of the person from whom he gained it. So far as this court is aware, the authorities are uniform in holding against the contention of the defendant in this case. Williams vs. Johnson, 112 Ind. 273; Railroad Co. vs. Shepherd, 30 Ind. App. 193; Warsaw vs. Fisher, 24 Ind. App. 47; Green vs. Sebagamain, 113 Wis. 508; McConnell vs. City of Osage, 80 Iowa, 293; Baxter vs. Cedar Rapids, 103 Iowa, 599; Burgess vs. Sims Drug Co., 114 Iowa, 275; Butler vs. Railway Co., 30 Abb. N. C. 78, affirmed in 143 N. Y. 630; Mellor vs. Railway Co., 105 Mo. 455.

Current Medical Literature

AMERICAN.

Titles marked with an asterisk (*) are abstracted below.

American Medicine, Philadelphia.

August 26.

1 *Three Cases of Tumor of Spinal Cord Operated on with Good Result. J. C. Warren, Boston.
2 *What Action Should Be Taken to Suppress Smallpox? H. M. Bracken, Minneapolis, Minn.
3 *Nature and Cause of Hunger, Appetite and Anorexia. M. I. Knapp, New York.
4 Beriberi. J. L. McCool, Marcus Hook, Pa.
5 *To What Extent Is Climate a Negligible Factor in the Treatment of Pulmonary Tuberculosis? W. L. Dunn, Asheville, N. C.
6 *Medical Treatment of Excessive Uric Acid in the Urine. B. Robinson, Chicago.

1. **Tumor of Spinal Cord Successfuly Operated On.**—Warren reports two cases of localized tumors of the spinal cord in which removal completely relieved the symptoms, and a third case in which operation was followed by marked improvement.

2. **Suppression of Smallpox.**—Bracken, in order to make the best report possible to the Conference of State and Provincial Boards of Health of North America on the best means of controlling smallpox, obtained from various public health officials, scientists and practitioners their opinions on this most important question, and uses these opinions as the basis for his arguments in favor of compulsory examination, at least of children, and against the indefinite continuance of quarantine as a means of suppressing smallpox. In conclusion he urges that the conference put itself on record as follows: Believing that all attempts to restrain smallpox by means of quarantine in a community not protected by vaccination will fail; that rigid quarantine in a well-vaccinated community is unnecessary; that attempts to control the spread of smallpox by means of quarantine is unscientific, irrational, unsuccessful and misleading; that in laying down strict rules for the quarantine of smallpox, sanitary authorities are favoring unscientific and illogical methods and are conveying false ideas as to safety, this conference protests against further attempts to control smallpox by means of quarantine and requests the passage of compulsory vaccination laws similar to those of Germany, requiring (1) the compulsory vaccination of infants, (2) revaccination at puberty. The conference should further place itself on record as requesting that steps be taken to secure a safe and efficient vaccine, and that vaccination be carried out by official vaccinators acting under the authority of the various boards of health; also that steps be taken to secure a vaccine the quality and efficiency of which are beyond question. Legislators and the people should be advised as to their responsibilities in suppressing smallpox, and a time should be set for the total abandonment of quarantine as a means of attempting to control this disease.

3. **Nature and Cause of Hunger, Appetite, and Anorexia.**—Knapp says that hunger is a lesser degree of pain, produced by the contraction of the muscularis either of the pylorus or of the entire stomach or of the duodenum, or of the contraction of the muscularis of all these structures. If the contraction is more intense, it is felt as a painful hunger. If the contraction is of a slight degree, it is evanescent. This is the reason hunger passes away after a certain lapse of time, even if no food has been taken; it means simply that the contraction gave way to relaxation. A "good and hearty" appetite should not be encouraged, nor should it be regarded with complaisance. Such an appetite must be considered as pathologic and must invariably be suppressed by the physician, as it is caused by a stronger contraction, hence causing greater irritation of the mucosa, which should not be. Absence of contraction, the inability to contract, relaxation, distension—these being the opposite, the reverse of contraction, result in anorexia.

4. **Beriberi.**—McCool thoroughly reviews the literature and reports four cases which he believes are illustrative of four of the six forms of beriberi.

5. **Climate in Tuberculosis.**—Dunn states that since the dietetic-hygienic regimen may be much more thoroughly and efficiently conducted under certain climatic conditions, climate is a negligible factor only: (1) When the financial status of the patient is such that he cannot live in the health resort under conditions just as good as those obtainable at home, with or without the expenditure of the same amount of money; (2) when the patient has not the moral strength to make a business of getting well; (3) when the disease has become hopelessly advanced.

6. **Medical Treatment of Excessive Uric Acid in Urine.**—Robinson says that the rational treatment of excessive uric acid in the urine consists in the administration of ample fluids at regular intervals and of foods containing elements to produce basic combinations with the uric acid forming urates which are freely soluble. He advises the administration of a flavored 12-grain sodium chlorid tablet. The patient places on the tongue a half tablet and drinks a glassful of water (better hot) before each meal, and in the middle of the forenoon (10 a. m.), middle of the afternoon (3 p. m.), and at bedtime (9 p. m.. The patient thus drinks three pints of 1/4 to 1/2 normal salt solution daily. This practically renders the urine normal, and acts as ample prophylaxis against the formation of uric acid calculus. If parenchymatous nephritis exists the salt should not be administered, as it excessively stimulates the renal parenchymatous cells. In such cases the water only should be given. An alkaline tablet is also given. It is composed of: Cascara sagrada, 1.6 mg. (1/40 gr.); aloes, .022 gm. (1/3 gr.); sodium bicarbonate, .065 gm. (1 gr.); potassium bicarbonate, .022 gm. (1/3 gr.); magnesium sulphate, .13 gm. (2 gr.). One-sixth to one tablet (or more as required to move the bowels once daily) is placed on the tongue before meals and followed by 236 c.c. (8 oz.) of water (better hot). At 10 a. m., 3 p. m. and bedtime one-sixth to one tablet is placed on the tongue and followed by a glassful of fluid. In the combined treatment the sodium chlorid tablet and alkaline tablet are both placed on the tongue together. This method furnishes alkaline bases (sodium and potassium) to combine with the free uric acid, in the urine, producing perfectly soluble alkaline urates and materially diminishing the free uric acid. The alkaline and sodium chlorid tablets take the place of all so-called mineral waters.

Medical Record, New York.

August 26.

7 *Asthma. S. Kohn, New York.
8 Freedom from Uric Acid and How to Obtain It. A. Haig, London.
9 *Long Island Appendicitis. A. E. Gallant, New York.
10 *Lacerations of the Cervix Uteri. A. H. Gardner, New York.
11 Case of Delayed Menstruation; Flow Established at First Spontaneously, Subsequently by Treatment; Conception. B. P. Hirst and H. Fox, Philadelphia.
12 *Serum Therapy in Erysipelas. J. C. Ayer, New York.

7. **Asthma.**—Kohn discusses the clinical history of asthma exhaustively. He doubts the universal utility of operative work in the nose, but speaks highly of the value of institutional treatment for asthma and urges the establishment of sanatoria for this purpose.

9. **Long Island Appendicitis.**—Gallant discusses cases treated on Long Island and formulates the following rules for guidance in deciding when to operate: 1. With a history of sudden, sharp abdominal pain, soon followed by nausea and vomiting and fever, appendicitis may be surmised, and if a little later the pain becomes localized or most intense in the right iliac region, with right-sided rigidity, the diagnosis stands confirmed. 2. The "safe" treatment of acute or recurrent appendicitis during the attack is operation within the first forty-eight hours following the primary pain. 3. If toward the close of the second day, in spite of an icebag continuously applied over the appendicular region and free castor-oil evacuation of the bowels, the pain and rigidity, with or without nausea and vomiting, temperature and pulse elevation, continue or return, to delay operation under such conditions can only subject the patient to the danger of rupture, extensive gangrene, general peritonitis, intestinal obstruction, and a fatal issue. 4. In the presence of a mass or of tumefaction delay is dangerous—operate at once. 5. Interval operation is free from danger, requires but seven days in bed, two weeks from business, and gives freedom for life.

10. **Lacerations of Cervix Uteri.**—Gardner sums up his views

on this question as follows: 1. Many ills are the result of unrepaired lacerations of the cervix. 2. The frequency and extent of these tears may, to a certain extent, be lessened by allowing more time for dilatation in the first stage of labor; by a more judicious use of the forceps in time and force; and by the proper use of podalic version. 3. The most frequent cause of subinvolution of the uterus and prolonged convalescence is unrepaired lacerations. 4. In all probability many of the frequently quoted morbid conditions ascribed to lacerations are the result of infection of the lacerated surface rather than the laceration itself. 5. Many cases of severe hemorrhage are due to unrecognized cervical lacerations. 6. Immediate repair in the hands of an able surgeon-obstetrician is the best means of controlling such hemorrhage, and also of preventing infection of the torn surfaces. 7. Primary tracheoplasty is easily and quickly done, but a secondary repair is a difficult and tedious procedure. 8. In case of failure in obtaining union in the primary operation, the condition of the woman is none the worse, while if successful, which is usually the case with skillful surgeons, the patient is spared many of the ills which lacerations of the cervix sooner or later entail.

12. **Serum Therapy in Erysipelas.**—Ayer reports the results obtained in 33 additional cases. He says that the shortening of the average duration of the disease by 2.6 days expresses the value of this form of treatment.

New York Medical Journal.

August 26.

13 Contribution to the Surgery of Perforating Gastric Ulcer. A. B. Mitchell, Belfast, Ireland.
14 *Astigmatism, Cause of Vomiting in School Children. A. Brav, Philadelphia.
15 *End Results in Surgery of the Kidney, Based on a Study of Ninety Cases, with One Hundred and Twenty-three Operations. A. V. Veer, Albany.
16 Preoperative and Postoperative Treatment of Surgical Cases. J. E. Canaday, Paint Creek, W. Va.
17 Tropical Diseases of the Angola Highlands. F. C. Wellman, Benguella, West Africa.
18 Extragenital Chancres. A. L. Wolbarst, New York.
19 The Fly and Tuberculosis. T. J. Mays, Philadelphia.
20 Sterility in Women. Pathologic Affections of the Ovaries and Tubes that Produce It, and Their Treatment. J. R. Goffe, New York.

14. **Astigmatism a Cause of Vomiting in School Children.**—Brav finds that some children, during their school term, have regular attacks of vomiting, the primary cause of which is often obscured. He says that it may be laid down as a rule that vomiting in school children, not preceded by a sensation of fullness, distress in epigastrium, epigastric pain, eructation of gases, regurgitation of fluid, heartburn, fever and chills, is caused by astigmatic errors of refraction which demand correction.

15.—See abstract in THE JOURNAL, July 29, 1905, page 346.

Medical News, New York.

August 26.

21 *Appendicostomy and Cecostomy in the Treatment of Chronic Colitis. W. Meyer, New York.
22 Contribution to the Study of Chronic Nicotine Intoxication of the Nervous System. F. Robbins, New York.
23 *Summary of Twenty-five Radical Operations on the Rectum Under Local (Sterile Water) Anesthesia. A. B. Cooke, Nashville, Tenn.
24 The Insane of Canada; Presidential Address. T. J. W. Burgess, Montreal, Canada. (Continued.)
25 Natural and Artificial Protection of Man Against Tuberculosis. F. Figari, Genoa, Italy.
26 Dermoid Cysts of the Mediastinum. R. S. Morris, Ann Arbor, Mich. (Continued.)

21. **Appendicostomy and Cecostomy in Chronic Colitis.**—Since October, 1902, Meyer has made use of appendicostomy for obstinate chronic colitis, amebic as well as ulcerative, in four patients, and of cecostomy in one, a man in whom the appendix seemed of too small caliber to permit of thorough flushing. These five cases nicely demonstrate the great value of colon flushing in the various chronic affections of the large intestine, catarrhal, tuberculous, specific and amebic. Of course, in cases of chronic catarrh due to the presence of multiple papillomata, there is not much benefit to be derived from the treatment. They, further, show the excellence of Weir's idea of utilizing the appendix for this purpose, disproving the fear entertained by many, viz., that irrigation through a small tube would be unsatisfactory. If two quarts of fluid introduced through a tube 14 mm. in circumference, can be made to pass the entire large intestine within ten minutes, this is all that can be expected. Meyer says that in view of the obstinacy of ulcerative colitis in its various forms, and its tendency to recurrence, too much stress can not be laid on the advisability of keeping open the communication with the caput coli for a considerable length of time, and of insisting on a properly selected diet in conjunction with rational internal medication. Both must assist the salubrious effect of colon flushing. Meyer considers appendicostomy the operation of choice in all cases of obstinate, chronic colitis. It is simple, safe and effective, and the same is true of the after-treatment. He gives it the preference over cecostomy in all cases in which the appendix is passable.

23.—See abstract in THE JOURNAL, July 8, 1905, page 129.

Boston Medical and Surgical Journal.

August 24.

27 *Empyema of the Frontal Sinus. F. C. Cobb, Boston.
28 *Localization of Chronic Suppurations of the Urinary Tract. A. L. Chute, Boston.
29 Efficacy of Serum Treatment in Streptococcus Puerperal Septicemia. E. B. Young, Boston.
30 What the Suburban Surgeon Is Doing in the Abdomen, and How He Does It. C. E. Durant, Haverhill, Mass.

27. **Empyema of Frontal Sinus.**—Caleb discusses the clinical history of this affection, and the methods of operating for its cure. He sums up the advantages and disadvantages of these methods as follows: The Ogsten-Luc operation has for advantage the slight deformity produced. For disadvantage it has the great probability of recurrence. The same is true of Jansen's method. Kuhnt's, Ridell's and Coakley's methods yield less probability of recurrence, as they destroy the sinus, but they produce greater or less facial deformity, Coakley's probably giving the least of the three. To all of these methods there is one great objection—that the ethmoid cells are not sufficiently considered. Killian's operation seems to combine the advantage of sinus obliteration with the removal of the ethmoid cells; but it is hard to judge as yet of its practical results as far as deformity and danger to the eye are concerned.

28. **Localization of Chronic Suppurations of Urinary Tract.**—Chute emphasizes careful location of chronic urinary suppurations as an essential for accurate treatment. He has found the conclusions drawn from the glass tests, as applied to suppurations of the urethra, often misleading, while those drawn from the irrigation test are more accurate. Without cystoscopic examination, it is at times almost impossible to differentiate chronic suppurations of the bladder from those of the kidney. Before operating on a suppurative lesion of the kidney it is essential to verify the diagnosis as to which kidney is involved, either by seeing turbid urine issuing from the corresponding ureteric orifice or by ureteral catheterization. Reliance on symptoms alone, even when these seem to leave no doubt, may lead to serious error.

St. Louis Medical Review.

August 19.

31 *Prophylaxis and Treatment of Yellow Fever. F. Forchheimer, Cincinnati, Ohio.
32 *Malarial Origin and Propagation of Yellow Fever. W. H. Ford, St. Louis.

31. **Prophylaxis and Treatment of Yellow Fever.**—This article forms in substance the chapter on yellow fever in Forchheimer's text-book on practice. It offers nothing new.

32. **Malarial Origin and Propagation of Yellow Fever.**—Ford discusses the yellow fever situation in New Orleans; the insalubrity of that city; the inadequacy of the pure quarantinist and of the pure mosquito doctrine; the doctrine that yellow fever is a malignant grade of malaria, which he says is good in spite of its being old, and the local causes of yellow fever. The article is continued.

Lancet-Clinic, Cincinnati, Ohio.

August 26.

33 Adenoids, Their Etiology and Symptoms. B. L. W. Floyd, Evansville, Ind.
34 Education and Hygiene of the Nervous System. H. H. Hoppe, Cincinnati.
35 The Decision to Operate. A. M. Cartledge, Louisville, Ky.

Medicine, Detroit, Mich.

August.

36 *New Technic for the Determination of the Secreting and Evacuating Functions of the Stomach. F. A. McGrew, La porte, Ind.

37 Controversy Concerning the Use of Cantharides Internally. Historical Sketch. T. L. Coley, Philadelphia.
38 Treatment of Hemorrhoids. C. F. Martin, Philadelphia.
39 *Diagnosis of Ureteral Stones. M. L. Harris, Chicago.
40 Problem of Preventing Tuberculosis. J. McFarland, Philadelphia.
41 *New Clinical Phenomena. A. Abrams, San Francisco.
42 *Celluloid Corset—Consideration of Its Usefulness and the Technic of Manufacture. H. W. Jones, St. Louis.

36. **Determination of Secreting and Evacuating Functions of the Stomach.**—McGrew describes his method as follows: In the morning, fasting, the patient is given a test meal consisting of 60 grams of biscuit and 240 c.c. of a solution made up of 30 c.c. of the iron indicator and 210 c.c. distilled water. For practical purposes nine biscuits and an eight-ounce bottle filled to the neck, putting in first the 30 c.c. iron solution and adding distilled water, will afford a ready means of dosage and be surprisingly accurate. One hour after its ingestion the test meal is withdrawn, following the Mathieu-Rémond technic. To dilute the stomach contents, pour into the stomach, through the tube, 200 c.c. of distilled water. The patient then mixes the water and stomach contents thoroughly by active abdominal and diaphragmatic movements, which should be continued about two minutes, after which period the diluted specimen may be withdrawn, the tube having remained meanwhile *in situ*. In order to make the calculations it is necessary to know: 1, the quantity of the undiluted specimen; 2, the acidity of the undiluted specimen; 3, the acidity of the diluted specimen; 4, the quantity of iron which remained in the stomach into a graduate the first point is settled without more ado. Set the diluted specimen to filter. Thoroughly and vigorously stir the undiluted specimen with glass rod, after which 20 c.c. should be measured from it into an evaporating dish, and the remainder set to filter. To the 20 c.c. add 8 to 10 drops pure hydrochloric acid and 8 to 10 drops pure nitric acid, and boil the whole for several moments until the excess of nitric acid has been entirely driven off. Then add enough distilled water to bring the amount again to 20 c.c. and filter. To 10 c.c. of the filtrate add 5 c.c. of a 5 per cent. solution of ammonium sulphocyanid. Compare the color of this mixture with that of a standard solution composed of a 1/10 dilution of the mother iron solution, 10 c.c. of which (after the iron has been reduced to the chlorid by adding three or four drops of pure HCl and boiling until clear) are treated with 5 c.c. of the same 5 per cent. ammonium sulphocyanid solution. This is the ordinary colorimetric process. For example: Comparing the filtrate mixture and the standard solution, it appears that the former is a lighter shade, hence contains less iron. Add, therefore, mother solution of iron (reduced as above), drop by drop, reversing the tube back and forth after each to thoroughly mix the solutions, until the colors in the two tubes exactly correspond. Then, taking the lower level of the discus, calculate the amount of iron added. Suppose the tube to have contained 10 c.c. filtrate to which 5 c.c. ammonium sulphocyanid solution has been added, and the tube shows that 6 c.c. mother iron solution has been added to bring the color up to the standard. The 6 c.c. mother iron solution contains 6 mg. iron, but the same quantity of the standard solution contains 1 mg. iron. Therefore, the 10 c.c. filtrate contains 4 mg. iron. It remains to determine the total stomach contents, when the quantity of test meal remnant may be easily calculated. Using phenolphthalein as an indicator, ascertain the acidity of the diluted and the undiluted specimens respectively. Then calculate the total stomach contents by multiplying the acidity of the diluted specimen (A′) by the quantity of water introduced (Q), and dividing the result by the acidity of the undiluted (A) minus that of the diluted specimen (A′). Suppose the total stomach contents are found to have been 160 c.c. It has been previously determined that each 10 c.c. contain .4 mg. iron; but each 1 mg. is equivalent to 10 c.c. of the original test meal. Therefore, 64 c.c. of the original test meal remained within the stomach and 236 c.c., or 78 per cent., had been evacuated. The evacuatory percentage is, therefore, 78. The volume of the gastric juice is the total stomach contents, 160 c.c., less the volume of the test meal remnant, 64 c.c., or 96 c.c. This is 1.5 times the volume of the test meal remnant. The secretory percentage, therefore, is 150.

39. **Diagnosis of Ureteral Stones.**—According to Harris, a diagnosis of ureteral stones based on the symptomatology can never be more than presumptive, and previous to the advent of the Roentgen ray and the ureteral catheter, a diagnosis of ureteral stone in any portion of the ureter, except the lower end, was seldom made, except at operation. There may be other bodies in the pelvis capable of casting shadows which from appearances alone can not be distinguished from shadows cast by ureteral stones. Hence, in some of these cases a correct diagnosis can be made only by the use of the ureteral bougie.

41. **New Clinical Phenomena.**—Chromo-diagnosis is a word coined by Abrams to describe a method of examination which is specially applicable in the early detection of distended cutaneous veins. One may use colored glass, or, better still, sheets of gelatin of various colors, purchasable from any dealer in magic lanterns. For convenience the sheets may be mounted in cardboard frames. The patient faces the light, while the observer faces the patient. It will be found by looking through either magenta or red-colored gelatin, that the veins are brought into special prominence, and that many veins not evident to the unaided eye can be detected by the colors mentioned. Yellow gelatin will aid in the detection of the diaphragmatic excursions, although to a degree less evident than by painting the skin over the cutaneous are described by the excursions of the diaphragm with an alcoholic solution of gamboge. Green causes red cutaneous areas to appear black like silhouettes, whereas yellow intensifies the color of erythematous patches. Violet intensifies the most insignificant erythematous area. Blue intensifies brown spots. Violet causes yellow skin lesions to assume a salmon-pink color. The use of the foregoing colors refers to the effects obtained in daylight. Icteric coloration is not demonstrable by gaslight, but when a violet gelatin sheet is employed yellow is seen as a dark yellow. Let the patient rest in the recumbent posture with head nearest to the window, so that the light falls on the exposed chest from behind. The observer stands at the side of the patient, holding in his hand a red gelatin sheet in such a way that the light filtering through the sheet falls on the chest. In a thin subject, especially during forced inspiration, and with the sheet properly adjusted, the chest presents a skeletal appearance and the intercostal spaces are clearly differentiated from the ribs. In the examination of several cases of pneumothorax and hydrothorax the foregoing differentiation was found to be less pronounced or absent, and for this reason chromo-diagnosis may serve as an aid in the diagnosis of the affections mentioned.

42. **Celluloid Corset.**—The method of making the corset employed by Jones consists in pouring a plaster form of the body or part in question, smoothing and finishing this form or model, applying undershirts one after another on this form, and painting each one of these with the celluloid solution, until the desired thickness has been reached. A plaster cast of the trunk is first taken. This is filled with liquid plaster made just thick enough to pour with some difficulty. The cast is usually set first on a box, over a hole, which has been cut through the top, just large enough to admit a heavy stick, which is used to support the form. The object in having the central support larger at one end than at the other is twofold—to save as much plaster as possible in pouring, and to allow the support to be slightly withdrawn an hour or so after the plaster becomes hard. This can be done by resting the plaster form on some object and tapping the end of the support with a hammer until it is driven out a few inches. This will be more easily accomplished if the bar be greased previous to pouring. If this procedure be not gone through with, the water which remains in the plaster form will be absorbed by the wood, and in a few hours the swelling which takes place will break the form. If a bar of iron or piping be used in place of wood there is no danger of the form cracking, but in such case the bar must remain in the plaster and can not be used again without destroying the form. After the form has been poured twenty-four hours the cast can be stripped off, and this will be more easily accomplished if the inner side has been previously coated with vaselin. The form

should then be smoothed down carefully with a draw shave to cut down all humps, and later with a paper cutter's knife. All hollows should be filled with liquid plaster until the whole is fairly smooth. In making leather jackets it is usual to cover the form with a coating of shellac. This should never be done in making the celluloid jacket, as the acetone used later will cause the jacket to adhere to the cast so strongly that it will be ruined in removing. Instead, after the form is perfectly smooth, it should be rubbed down with talcum powder until the surface is shiny. The form is then ready for applying the celluloid. A supply of women's summer undershirts should be obtained or, if the jacket be a small one, children's undershirts. From five to eight or nine shirts will be used, according to the thickness of the jacket. Two of these are now fitted on the form, one over the other, and made to lie perfectly smooth. The celluloid, which will be the color of honey and the consistency of molasses, is poured from the bottle, preferably into a tall graduate of a pint capacity, and larger at the top than at the bottom. A bowl can be used, or, in fact, any receptacle, but the graduate is convenient to mix the celluloid with more acetone, when it is too thick, and in other ways has proved the best. An ordinary painter's brush, three inches wide, is used for applying the liquid celluloid, which is laid on the shirted form and spread over evenly and rubbed in. It is not necessary to wait until one coat is dry before adding the next, as the acetone evaporates almost immediately. Three or four coats are painted on, and when the meshes of the shirt seem well filled and the celluloid begins to run over and around the sides of the form (the number of coats will depend on the consistency of the celluloid), no more should be applied for ten minutes. Then, while the celluloid in the shirts is still rather soft, another shirt is put on. This will adhere immediately and should be made perfectly smooth. This is filled in the same way, and the process is repeated until the desired number of shirts is used. If time is no object, the shirts may be allowed to dry one by one, and the process extended over several days. In order to ascertain when the desired thickness has been reached it is necessary to trim the jacket at the edge of the form, where the redundant undershirt overhangs, but care must be taken that a good clean cut be made downward and at a distance of a fraction of an inch inside the edge, as at the edge and beyond, the cut jacket will appear much thicker than it really is, since the different layers at this point are not so firmly matted together. The average thickness is from 2 to 3 mm., and it is rare that less than seven shirts are used. When the desired thickness has been reached, several layers are applied to the last shirt, until no more can be taken up. When dry the jacket will be smooth and shiny and of a yellow color. It can be made white by the addition of zinc oxid to the last few layers of celluloid, although this makes it duller. If too much zinc oxid is used, in case a very white jacket is desired and the last two or three shirts have been painted with the white solution, the jacket will be somewhat weakened, since the zinc makes the celluloid brittle. This is true also when white celluloid is used originally instead of the yellow. After the jacket is finished it should be allowed to remain on the plaster form for about a week. In the meantime it may be trimmed around the edges with a sharp, strong knife. In a week it will be dry enough to remove. A clean cut should be made directly down the middle into the plaster, the edges pried up and the jacket stripped off. If talcum powder has been used the jacket slips off easily, especially if the form has been well smoothed, but occasionally a little plaster will adhere to the inner side. This can be scraped out with a knife. The inside is never coated with celluloid, as it invariably changes the shape of the jacket. The jacket can now be tried on and trimmed out under the arms and at the bottom, so as to allow for sitting down, but it should not be allowed to remain very long off the form, as it has a tendency to curl up at the edges. When properly fitted, have a harness-maker bind the edges with leather, paste pads of felt where the jacket will come in contact with bony prominences, and either sew straps and buckles in front or insert hooks for lacing. Five or six straps are usually sufficient. When extra support is needed use strips of steel riveted to the jacket or attach apparatus to the jacket. Thus the actual outlay for materials in no case will exceed $14 or $15, and in most cases will be less than $10.

The Postgraduate, New York.

August.

43 *Radical Operation for the Cure of Chronic Frontal Sinusitis. T. J. Harris, New York.
44 *Brief Analysis of 350 Cases of Epilepsy. H. M. Cox, New York.
45 Stricture of the Eustachian Tube. W. C. Phillips, New York.

43. **Radical Operation in Chronic Frontal Sinusitis.**—The various operations employed in the treatment of this affection are discussed by Harris. He prefers Killian's operation which, he says, is indicated in many cases and gives uniformly good results.

44. **Epilepsy.**—Nearly all the patients constituting the series of 350 cases analyzed by Cox were chronic epileptics, representing almost all types of the disease. About 41 per cent. (146) were women, and 58 per cent (204 cases) were men. Fifty-six per cent. (196) occurred in the first decade of life; 27 per cent. (95) in the second; 11 per cent. (39) in the third; 4 per cent. (14) in the fourth, and 1.4 per cent. (5) in the fifth, and only one case occurred after the fifth decade. In 15 cases one or both parents were epileptic; in eight the father alone was affected. In 20 cases there was a history of epilepsy in the grandparents, uncles and aunts. In 18 cases in which epilepsy was not traceable in the ancestors, brothers and sisters were affected. Indirect hereditary influences were present as follows: Tuberculosis in 24 cases; alcoholism in 17 cases; neurasthenia and hysteria in 9 (in four instances it was in the mother); cancer in 6 cases; insanity, 5 cases; apoplexy, organic heart disease and paralysis, 12 cases; migraine, 3; paresis and nephritis, each 2; tabes, meningitis and diabetes, each 1. The exciting cause attributed in 157 of the cases under consideration was as follows: Dentition, 22; menstrual disorders, 21; trauma, 17, in at least 6 of which the attack caused the fall resulting in injury rather than the injury causing the attack; alcoholism, 10; masturbation, 9; cerebral palsies, 8; meningitis, 8; encephalitis, 7; scarlatina, 6; grief and anxiety, 5; measles, 5; diphtheria, 4; chorea, 4; hydrocephalus, 4; idiocy, 15; malaria, menopause, smoking, syphilis and autointoxication, each 2, and eyestrain, parotitis, dysentery and erysipelas, each 1. As to treatment, Cox says when the lesions can be localized and the vitality of the patient is sufficiently high, surgery should be resorted to, other measures failing, although the results obtained from operative interference are seldom curative, and, unfortunately, are disappointing.

Therapeutic Gazette, Detroit, Mich.

August.

46 *New Electric Head Light. W. C. Phillips, New York.
47 Osmic Acid Treatment of Tic Douloureux. W. W. Babcock, Philadelphia.
48 Disinfection of Catheters by Formalin. R. C. Rosenberger, Philadelphia.
49 *X-Ray Treatment of Deep-Seated Tuberculosis. H. K. Pancoast, Philadelphia.
50 Treatment of Erysipelas by the External and Internal Use of the Tincture of the Chlorid of Iron. A. H. Tickell, Nevada City, Cal.
51 *Appendices of Unusual Size. G. W. Spencer, Philadelphia.

46. **New Electric Headlight.**—Phillips has devised a new electric headlight which has a ball and socket joint and may be pointed in almost any direction. It is entirely insulated from the headband and there is no danger of shock or heat. It can be attached to the handle and is useful for transillumination purposes. By slipping off the cap it can be used for transillumination of the antrum. By putting in a frosted lamp, the fundus of the eye can be examined beautifully in a dark room, and it also can be used with the cystoscope.

49. **X-Ray in Deep-Seated Tuberculosis.**—Pancoast presents the results obtained in the treatment of deep-seated lesions of the larynx, lungs, peritoneum, joints and spine with the *x*-ray. He found that tubercular laryngitis may be aided and even cured by *x*-ray treatment, provided there can be brought about an improvement in the primary pulmonary condition. Too vigorous treatment will cause a reaction which may be carried to an unfavorable degree, therefore great care is necessary in determining the proper dosage in each case. Pulmonary lesions, in selected cases, may be benefited probably, but even

greater precautions should be observed. He does not consider Finsen-light applications of any value in treating laryngeal lesions. Only the most powerful lamps need be tried, and such exposures are of value only in lessening or retarding a skin reaction from the *x*-ray.

51. **Unusual Size of Appendix.**—The appendix removed by Spencer from one patient, aged 22, measured one inch in length and resembled a small grub worm. The appendix removed from another patient measured eight inches in length and was coiled on itself deep in the pelvis. The third specimen, removed by Dr. E. E. Montgomery, measured five and one-half inches in length and four and three-quarter inches in its larger circumference. It was not opened, but probably contained fluid.

St. Paul Medical Journal.

August.

52 *Need of a More Rational Therapy. J. W. Bell, Minneapolis.
53 *Case of Renal Decapsulation for Chronic Bright's Disease. L. F. Schmauss, Mankato, Minn.
54 Sanatorial Care of Tuberculosis. H. L. Taylor, St. Paul.
55 *Accurate Determination of Errors of Refraction, Without Cycloplegia by Means of Astigmatic Charts. C. N. Spratt, Minneapolis.
56 Best Form of Incision in the Extraction of Cataract. C. Williams, St. Paul.
57 Compound Fractures. E. A. Hensel, Alexandria, Minn.

52. **Rational Therapy.**—Bell calls attention to the fact that while preventive medicine is steadily moving onward, winning victories on every hand, therapeutics has for years occupied, and still occupies, an unenviable position, and that this is especially true of drug treatment. He states that therapy is the one weak link in medicine. He reviews the treatment of disease during the last three decades and discusses the relation of physicians to proprietary medicines. The following reasons, he thinks, are responsible for the present state of affairs: 1. Insufficient and impractical instruction in this branch of medicine. 2. The unfortunate tendency in medical schools to devote all energy to the investigation, detection and prevention of disease, to the exclusion of rational therapy. 3. The delusion of considering drugs the only agents for combating disease, thus seriously minimizing the beneficial effects of modern therapy. 4. The willingness of a considerable part of the profession to prescribe anything and everything thrust on the market, regardless of composition or merit. 5. The worse than evil influence of the so-called therapeutic nihilists in the ranks of the profession. Bell reviews the various means of remedying this state of affairs and refers to the work of the Council on Pharmacy and Chemistry in the following terms:

> The important work undertaken by the Council on Pharmacy and Chemistry of the American Medical Association, will doubtless prove exceedingly helpful and beneficial to the entire profession, but more especially to the indifferent prescriber, ready and willing to prescribe anything and everything, regardless of merit. The Council on Pharmacy and Chemistry, composed of able and experienced pharmacists and chemists, proposes to examine into the composition and the status of the various medical preparations offered to physicians, which are not included in the United States Pharmacopeia or in other standard text-books. These will include the synthetic chemical compounds, as well as the so-called proprietaries and pharmaceutical specialties put out under trademarked names. Preparations which conform to the standard established by the Council will be incorporated in "New and Non-official Remedies," a book to be published by THE JOURNAL of the American Medical Association. This distinguished body of impartial experts should receive the hearty co-operation of all honorable manufacturing pharmacists and chemists, and of the entire medical profession, in making this important work in the highest degree successful. Let us hope that this important work will be fearlessly pursued, in order that reliable results may follow.

He says that with the new and expurgated pharmocopeia and the valuable aid of the Council on Pharmacy and Chemistry, with the growing feeling in the profession in favor of a rational therapy, we may hope to see the weak link in medicine, therapeutics, so strengthened in the near future as to commend itself alike to the public and to the skeptic within the profession. He also refers at some length to the need of medical education and of uniform medical laws.

53. **Renal Decapsulation.**—After careful study of the literature and observations in a personal case, Schmauss concludes that the Edebohls operation is deserving of further trial, and that we are not only justified in recommending it in suitable cases, after the various therapeutic measures have been sufficiently tried and found wanting, but that it is our duty to do so. This operation, like any other, has not only its indications, limitations and contraindications, as already pointed out, but also its difficulties—(a) unusually small space between last rib and ilium, either due to a short waist, or great length and obliquity of the twelfth rib; (b) undue mobility of the kidney, so that it may be difficult to locate it; (c) perinephritic adhesions or high locations up under the ribs—especially when enlarged, as in his case; (d) firm attachment of the capsule proper in some cases of interstitial nephritis. Certain precautions must be observed to insure the best results: 1, The patient should be carefully prepared for the operation; 2, the development of shock and anuria should be counteracted by appropriate measures; 3, the ilio-hypogastric and ilio-inguinal nerves are to be preserved; 4, undue trauma to the kidney proper and the surrounding structures should be avoided; 5, in replacing the kidney care must be exercised to avoid twisting the pedicle. Much has been said about posturing the patient to facilitate delivery of the kidney; this will increase the working space and help to bring up a loose kidney, but will not influence a normally situated kidney up under the ribs. On the contrary, it has occurred to Schmauss that a pillow or roll might increase the difficulty. Grasping the fatty capsule with a number of small forceps, and thus drawing out the organ, has been advised, but this is only possible if the kidney is movable. Schmauss makes an oblique incision parallel with the twelfth rib, and, if necessary, resecting the latter. Thus retraction can be exerted upward and thereby the kidney rendered more accessible and more room obtained for the hand. In this way considerable time is saved, the fat is disturbed less, and the kidney is spared undue trauma—through handling, pulling, tearing, etc.

55. **Determination of Errors of Refraction.**—Spratt recorded the comparative results obtained with the use of charts without cycloplegia and again of the same eye after instillation of homatropin, 2 per cent., every ten minutes, for a period of one and one-half hours. The patients, all of whom were adults except six, were selected only with reference to their intelligence. In 95 per cent. of cases the astigmatism determined by the use of charts and fogging, but without cycloplegia, was within .25 D. of that found after the use of homatropin. This includes 95 (75 per cent.), of a total of 126 eyes in which there was no difference in the amount. In 4 cases there was an apparent error of .37 D. and in one case an error of .50 D. No eye in the above series would have been given too strong a concave glass if the cycloplegic had been omitted. In two-thirds of the eyes the total myopia corresponded exactly with that found under a cycloplegic. The remaining one-third would have been under-corrected from .12 D. to .37 D. Several cases showing from —.3 D. to —.7 D. of myopia are included in the above. As would be expected, there was less uniformity in results obtained in the eyes showing hypermetropia. Fourteen cases showed less than .50 D. and in 35 eyes (or 42 per cent.), the total hypermetropia was correctly determined without cycloplegia. Spratt concludes his paper as follows: With intelligent adults, subjective methods of refracting are preferable to objective methods. The comparison of two lines at right angles, these corresponding to the axis of maximum and minimum refraction of the dioptric system of the eye, is a more accurate method of determining errors of refraction than by the use of test letters. Astigmatic charts, as devised by Verhoeff, are preferable to the single line charts, as the contrast produced by the cross lines enables one to estimate more accurately any difference in distinctiveness in the test lines corresponding to meridians of maximum and minimum refraction. In practically all cases the astigmatism and myopia can be as accurately determined without as with cycloplegia. A large proportion of cases of hypermetropia can be satisfactorily refracted without the use of cycloplegia.

Journal of Infectious Diseases, Chicago.

May.

58 *Report of Committee on Standard Methods of Water Analysis to the Laboratory Section of the American Public Health Association.
59 Concerning Tests for B. Coli Communis in Water. G. W. Fuller, New York, and C. E. Ferguson, Indianapolis, Ind.
60 Characteristics of Colon Bacilli and the Value of the Presumptive Test. G. Van E. Stoughton, New York.
61 Chemical Phases of a Water-Softening Problem. A. E. Kimberly, Columbus, Ohio.

62 Typhoid-like Bacilli in the Water Supply of Fredericton, N. B. F. C. Harrison.
63 *Persistence of Agglutinability in Typhoid Bacilli in Water. E. O. Jordan, Chicago.
64 Chemical and Bacterial Composition of the Sewage Discharged into Boston Harbor from the South Metropolitan District. C. E. A. Winslow and E. B. Phelps.
66 Number of Bacteria in Sewage and Sewage Effluents Determined by Planting on Different Media and by a New Method of Direct Microscopic Enumeration. C. E. A. Winslow, Boston.
67 Mode of Action of the Contact Filter in Sewage Purification. E. B. Phelps and F. W. Farrell, Boston.
68 Determination of the Organic Nitrogen in Sewage by the Kjeldahl Process. E. B. Phelps, Boston.
69 Tests of a Method for the Direct Microscopic Enumeration of Bacteria. C. E. A. Winslow and G. E. Willcomb, Boston.
70 Report of Committee on Antitoxic and Immunizing Sera.
71 Importance of the Paradysentery Bacilli. W. H. Park, New York.
72 Occurrence of Bacterium Pneumoniæ in the Saliva of Healthy Individuals. W. D. Frost, C. B. Divine and C. W. Reineking, Madison, Wis.
73 *Laboratory Methods and Devices. F. F. Wesbrook, Minneapolis.
74 *Improvement in the Technic of the Indol Test. J. McFarland and J. Hamilton, Philadelphia.
75 Copper Sulphate as a Germicide. G. A. Johnson and W. R. Copeland, Columbus, Ohio.
76 Metamorphosis of Filaria in the Body of the Mosquito (Culex Pipiens). M. G. Lebredo, Havana, Cuba.
77 *Possible Cause of the Formation of Gas in Cans of Condensed Milk. C. W. Dodge, Rochester, N. Y.

58 and 63.—See abstracts in THE JOURNAL, Feb. 4, 1905, page 413.

73. **Laboratory Methods and Devices.**—Wesbrook describes the following apparatus: For counting colonies in Petri dishes; stands for museum exhibition of permanent fixed cultures of bacteria; complete and rapid anerobiosis; bimetallic thermo-regulator with special arrangement for easy cleaning and adjusting; devices for displaying and labeling pathologic specimens; agar hanging drop; devices for staining a large series of microscopic culture perforations on cover slips or on slides; method of preparing rapidly a serum for diphtheria diagnosis which will yield a medium of constant quality; a modified Drigalski-Conradi crystal violet medium; tests of embalming fluids; field methods in the bacteriology of water, and filing methods for water data.

74 and 77.—See abstracts in THE JOURNAL, Feb. 4, 1905, page 413.

Ophthalmic Record, Chicago.

July.

78 **Melanoma of Choroid.** Report of One Case of This Character and of Pigmented Sarcoma of the Choroid Early in Its Development. G. E. de Schweinitz and E. A. Shumway, Philadelphia.
79 Cystic Sarcoma of Orbit: Extirpation: Death. H. F. Hansell, Philadelphia.
80 Recurrent Iritis. H. Woods, Baltimore, Md.
81 Exenteration Knife-Spatula. C. H. Beard, Chicago.

Kansas City Medical Index-Lancet.

July.

82 **Mesenteric Cystoma.** F. T. Van Eman, Kansas City, Mo.
83 Intussusception. C. E. Fulton, Springfield, Mo.
84 Case of Acute Inversion and Prolapse of the Uterus. B. L. Eastman, Kansas City, Mo.
85 Catarrhal Condition of the Liver and Ducts Simulating Gallstones. H. S. Hill, Springfield, Mo.
86 Physiology of Saline Cathartics. G. W. Robinson, Kansas City, Mo.
87 Remarks on Gallstones. D. W. Howell, Havana, Kan.
88 Successful Use of Adrenalin Chlorid Solution in Treatment of Appendicitis. S. J. Hampshire, Overbrook, Kan.

Medical Examiner and Practitioner, New York.

July.

89 Medical Examinations for Life Insurance. S. M. Spaulding, Los Angeles, Cal.
90 Adjusting Accident and Health Claims. C. H. Harbaugh, Philadelphia.
91 Infection in Transportation. H. M. Bracken, Minneapolis, Minn.

Providence Medical Journal.

July.

92 Physician and the Community. W. H. P. Faunce.
93 Chronic Purulent Otitis Media with Meningitis, Epidural Abscess and Sinus Thrombosis. G. W. Van Benschoten, Providence, R. I.
94 Treatment of Inoperable Malignant Growths with Coley's Toxins. William E. Wilson, Pawtucket, R. I.
95 State and Diphtheria. G. T. Swarts, Providence.

Journal Medical Society of New Jersey, Newark.

July.

96 Proof of Existence of Amblyopia Ex Anopsia in Strabismus. W. B. Johnson, Paterson.
97 Diagnosis of Appendicitis when the Appendix Lies in the Pelvis. G. N. Waite, Newark.
98 Practical Therapeutics. P. J. H. Markley, Camden.
99 Diet in Typhoid. J. E. Pratt, Dumont.
100 Bacteriology of Epidemic Cerebrospinal Meningitis. J. T. Hanan, Montclair.
101 Dangers of Infected Milk. R. C. Newton, Montclair.

Nashville Journal of Medicine and Surgery.

July.

102 Two Cases in which Foreign Bodies Were Swallowed, and After Producing a Remarkable Set of Symptoms, Were Extracted from the Rectum. C. S. Briggs, Nashville, Tenn.

Denver Medical Times.

July.

103 Toxic Amblyopia. I. W. Snow, Salt Lake City, Utah.
104 Congenital Dislocation of the Hip. S. C. Baldwin, Salt Lake City, Utah.
105 Treatment of Asthma. R. Levy, Denver.
106 Normal Obstetrics: Physiology of the Puerperium. T. M. Burns, Denver.

Journal of the Kansas Medical Society, Kansas City, Kan.

July.

107 Skin Therapeutics. H. Wilkinson, Kansas City, Kan.
108 Case of Absence of the Uterus. C. P. Grover, St. Joseph, Kan.
109 Use of Paraffin in the Correction of Deformities of the Nose. Hal Foster, Kansas City, Mo.
110 Case of Detached Retina. G. W. Maser, Parsons, Kan.
111 What Every Doctor Ought to Know About Eyes. J. R. Scott, Garnett.
112 Eclampsia. M. A. Finley, Cherryvale.

St. Louis Courier of Medicine.

July.

113 Baby Incubators on the "Pike." J. Zahorsky, St. Louis.
114 Two Cases of Penetrating Gunshot Wounds of the Abdomen and One of Gallstone Disease. J. Y. Brown, St. Louis.
115 Multiple Aneurism of the Aorta. W. N. Horton, St. Louis.
116 Huntington's Chorea. G. H. Cottral, St. Louis.
117 Specimen of Multiple Sarcoma of the Spinal Column. M. A. Bliss, St. Louis.
118 Delicate Test for Albumin in Urine. A. N. Ravold, St. Louis.

Archives of Physiological Therapy, Boston.

July.

119 Mechanical Vibration and Stimulation. J. H. Burch, Baldwinsville, N. Y.
120 Diagnosis of the Size, Form, Position and Motility of Stomach and Bowel by Means of X-Ray. G. E. Pfahler, Philadelphia.
121 Physicotherapy of Neurasthenia. J. A. Riviere, Paris, France.

Journal of Medicine and Science, Portland, Maine.

July.

122 Cholecystitis: Its Etiology and Treatment. C. R. Burr, Portland, Maine.
123 Clinical Society of New York Polyclinic Medical School and Hospital. D. S. Dougherty.

International Journal of Surgery, New York.

July.

124 Ectopic Gestation. R. Waldo, New York.
125 Prostatic Obstruction: Its Radical Cure. P. Syms, New York.
126 Death Due to Careless Plugging of Nose: Remarks on Treatment of Nasal Hemorrhages. W. Freudenthal.
127 Radical Cure of Cancer of Uterus. A. L. Smith, Montreal, Canada.
128 Surgical Diagnosis. F. D. Gray, Jersey City, N. J.

Northwestern Lancet, Minneapolis.

July 1.

129 Examination of Feces. C. Nootnagel, Minneapolis.
130 Intestinal Amebiasis. C. H. Bradley, Minneapolis.

FOREIGN.

Titles marked with an asterisk (*) are abstracted below. Clinical lectures, single case reports and trials of new drugs and artificial foods are omitted unless of exceptional general interest.

British Medical Journal.

August 12.

1 *Behavior of Leucocytes in Malignant Growths. J. B. Farmer, J. E. S. Moore and C. E. Walker.
2 Disposal of Wounded in a Naval War. C. M. Beadnell.
3 Arrangements for Treatment of Wounded in Action on Board H. M. S. *Magnificent* (Majestic Class). O. W. Andrews.
4 Collection and Distribution of Wounded in a Modern Cruiser Engagement. T. Austen.
5 Remarks and Suggestions on the Head Dress of Certain Ratings in His Majesty's Fleet. E. J. Biden.
6 Voluntary Civil Ambulance Wagon. H. J. Barnes.
7 Dysentery: Its Causation, Varieties and Treatment on Active Service. E. L. Jenkins.
8 Id. N. Falchnie.
9 Military Medical Reserve Difficulty. M. M. O'Connor.
10 Care of Soldier's Feet. P. B. Giles.

1.—See abstract in THE JOURNAL, Sept 2, 1905, page 742.

The Lancet, London.

August 12.

11 Chemical Correlation of the Functions of the Body. E. H. Starling.
12 Notes on African Pigmies. G. E. Smith.
13 *Frontal Sinusitis: Two Cases of Death After Operation. St. C. Thomson
14 Case of Parotitis Due to the Pneumococcus. S. Hastings and W. T. Hillier
15 *Aspiration in Diseases of the Ear and Nose. M. R. Sonderman.

berly, Columbus, Ohio.

16 Delayed Chloroform Poisoning. E. W. Scott Carmichael and J. H. Beattie.
17 *Congenital Multiple Occlusions of the Small Intestine. J. G. Emanuel.
18 *Case of Sacculated Aneurism of the Abdominal Aorta, Treated by the Introduction of Silver Wire and the Passage of Constant Current. C. A. Griffiths.
19 Fracture of Head of Radius. R. Knox.

13. **Frontal Sinusitis.**—Thomson reports 2 cases, both terminating fatally. In the first case the cause was meningitis following an osteomyelitis due to septic absorption from chronic suppuration in the frontal and ethmoidal sinuses. Evidently the traumatism caused by the Caldwell-Luc operation performed on the left maxillary sinus stimulated the latent suppuration in the ethmoid and frontal cavities of the same side, and surgical treatment of the left frontal sinus led to septic absorption from the chronic suppuration going on in the frontal and ethmoidal sinuses on the opposite side. This patient died three months from the onset of symptoms and two months from the first opening of the left frontal sinus. The second patient died about a year and a half after the first operation from a meningitis caused by subdural abscesses. Thomson concludes as follows: 1. In cases of multisinusitis it is well to drain the maxillary cavity some time before the frontal sinus is operated on. Both cavities may be operated on at the same time; but if only one sinus is operated on at a time it should be the frontal sinus, the lower cavity being drained until it can be opened. 2. In spite of a free opening of the frontal sinus, the establishment of a large communication with the nose, and the avoidance of closure of the external wound, a slow infection of the bone may take place leading ultimately to infection of the meninges. This may even be started in suppurating cavities on the side opposite to the one operated on. 3. The local condition of the wound, as well as the pulse, temperature and feelings of the patient, may fail to indicate the onset of mischief. After from one to three weeks this is revealed by headache, pain, tenderness and puffy swelling on the forehead or around the eyes. 4. When septic osteomyelitis has started the most vigorous measures may fail to arrest it. It may last one and a half years before terminating fatally. 5. The chief danger appears to lie in the ethmoidal labyrinth, owing to its anatomic irregularities and to the difficulty of treating them satisfactorily. 6. Up to the present the operation which best meets these difficulties is that of Killian. In many cases a preliminary endonasal operation on the ethmoid is advantageous.

15. **Aspiration in Diseases of the Ear and Nose.**—Sondermann has devised an apparatus for aspiration in diseases of the ear and of the nose which, he believes, possesses no disadvantages. It consists of a hollow mask open at one side and surrounded by a hollow ring of hardened rubber, and by means of an elastic tube it is connected with the suction ball. The latter, as well as the elastic tube, possesses a valve by which the air can only pass outward after the suction ball has been compressed. As the mask is of triangular shape it can also be applied to the nose if required. By a slight pressure it fits almost hermetically on the skin and, therefore, can be applied easily at any time by the patient himself without the help of another person. There is no contact whatever with the external meatus and its contents and there is scarcely any danger to be feared from too strong a suction, as the rarefaction of air is spread over a relatively large space and can not exceed the amount corresponding to the elasticity of the suction ball. In cases of acute suppuration a slight aspiration will be found sufficient in order to evacuate the pus from the middle ear and even from the cells of the mastoid process into the external meatus. On the other hand, in cases of chronic empyema a stronger suction ball can be used, and especially when the membrana tympani or the ossicles are partly or entirely missing. Then it will be possible to exert a more intense suction, by which less fluid secretions are discharged if the nidus is connected with the middle ear. To this must be added that the walls of the cavity are artificially rendered hyperemic. In two cases of acute suppuration of the middle ear in which the mastoid process was also affected by the disease, as was shown by the swelling and the tenderness, and in which the intense pain continued in spite of the free and copious discharge of pus, the aspect of both the cases changed at once after the pus had been evacuated several times a day by aspiration. The pain and tenderness ceased almost directly as well as the discharge and the patients rather liked the aspiration because they felt an immediate relief in both head and ear. The result of the treatment has also been satisfactory, for the condition of the ears after the application was by no means worse than it had been before. It appears from this that the ears had not in any way been injured by the suction method, although it had been frequently applied. On the other hand, it is scarcely to be feared that any harm should result as the suction force required for evacuating pus is but slight. There is no doubt but that the patients are treated in this way far more pleasantly than by attempts at removing pus by compressing the air in the Eustachian tube or in the external meatus. The apparatus used for the suction method when applied to the nose has the same form as the one described above, but, of course, its mask is smaller, as the two nostrils and their immediate neighborhood only need be hermetically closed.

17. **Congenital Multiple Occlusions of Small Intestine.**—The small intestine of the patient, in the case reported by Emanuel, was occluded in three places, while in five others the lumen of the bowel was practically obliterated by angular constructions giving rise to a localized distention of the intestine immediately above, and a relative collapse below the points of construction. The specimen was taken from an infant seven months old. Operative interference was deemed inadvisable. On opening the abdomen at autopsy, the most conspicuous feature was a distended duodenum which was of even greater volume than the stomach. The bowel was completely obliterated at the duodeno-jejunal junction. The second and third obliterations were found in the jejunum. The annular constrictions were all situated in the jejunum.

18. **Silver Wire and Electricity in Aneurism of Abdominal Aorta.**—The aorta having been exposed, Griffiths selected a spot on the surface of the tumor devoid of large vessels, and enclosed a small circle in a purse-string suture. Through the center of this a fine long metal trocar and cannula were thrust well into the sac. The trocar was withdrawn, the cannula remaining in position, and through this was introduced a vulcanite cannula for insulating purposes. Next some fine silver wire was introduced into the sac through the double cannula. After a foot or so of wire was introduced the wire kinked, so it was cut off flush with the cannula and pushed home with a ramrod which had been specially prepared with a cupped end for this purpose. Some more wire was then pushed through and connected with the negative terminal of a constant current battery, the circuit being completed through the patient by means of an electrode placed on the thorax. A current of from 15 to 25 milliamperes was given and continued for 15 minutes. At the end of this time it was noticed that the aneurism felt harder and the expansile pulsation had grown less even if it had not quite disappeared. The wire (about six feet) was then pushed home with the ramrod, and the cannula withdrawn. The purse-string suture was tied, and the abdomen closed. It was noticed after the abdomen was closed that the bulging caused by the tumor had almost disappeared. The patient suffered greatly from shock and although consciousness was recovered, restlessness was very marked, the patient throwing himself about and exhausting what little pulse remained. He died five and a half hours after operation. The postmortem examination showed that there had been no hemorrhage. The heart was healthy; the arch of the aorta showed signs of atheromatous changes. The aneurism came off from the main trunk of the abdominal aorta and communicated with it by means of a narrow elongated mouth about one and a half inches in length. The sac was filled with a dark clot and coiled wire, a double loop of which had entered the aorta and passed for about two and a half inches up into the thoracic aorta. There was no erosion of the vertebræ.

Revue de Chirurgie, Paris.

Last indexed XLIV, page 1968

21 (XXV. No. 6.) Un cas de hernie interstitielle chez une fille de neuf ans avec remarques sur cette forme de hernie (interstitial hernia in girl of 9). C. Greene-Cumston (Boston).

22 *Forward Dislocation of Atlas in Man of Megalithic Age.—Pathologie prehistorique: un cas de luxation simple de l'atlas sur l'axis en avant chez un homme de l'époque mégalithique. M. Baudouin.

22. **Luxation of Atlas in Man of Megalithic Age.—Baudouin,** in conducting antiquarian researches in the western part of France last year, excavated a skeleton with forward dislocation of the atlas. The skeleton was found under an enormous slab of stone, and before it was removed it was preserved intact by pouring a solution of silica over it. The depression in which it lay was also silicated, thus confirming the findings in the skeleton. The luxation was evidently accidental, due to the falling of the large slab. Baudouin reviews other cases of forward luxation of the atlas on record, showing the exact correspondence with the findings in this skeleton of a prehistoric being.

Presse Médicale, Paris.

23 (No. 46, June 10.) Diagnostic des tumeurs de l'hypochondre droit. T. Tuffier.
24 (No. 47.) *Des embolies hydatiques de l'artère pulmonaire. M. Garnier and J. Jomier.
25 *L'hydro-hémolyse. Recherche du bacille de Koch et des autres microbes dans le sang. L. Nattan-Larrier and A. Bergeron.
26 (No. 53.) Contribution à l'étude de l'hermaphrodisme des voies génitales. G. Lombardi.
27 (No. 54.) Pathogénie de l'appendicite. P. Reclus.
28 Les conséquences gynécologiques du Malthusianisme. L. M. Bossi.
29 Traitement local des urétrites chroniques. P. Lebreton.
30 (No. 55.) Affolement bulbaire (disturbances with anguish). M. L. Levi.
31 Réduction des luxations récentes de l'épaule par un procédé simple et non-douloureux (treatment of dislocation of shoulder). H. Huguier.

24. **Hydatid Embolism of Pulmonary Artery.**—The syndrome induced may be that of ordinary embolism of the lungs, or it may be modified by the character of the embolus. The special syndrome is characterized by sudden onset accompanied by symptoms suggesting ordinary pulmonary embolism, but with the intense, persisting dyspnea unaccompanied by distinct stethoscopic signs. Hemoptysis and symptoms of asystole also develop, terminating fatally in time. In some cases an ascending infection hastens the accidents and death ensues in a syndrome suggesting pneumonia. A history of hydatid cysts elsewhere facilitates the diagnosis. The hydatid vesicle does not completely obstruct the vessel, nor does it entail secondary thrombosis, but the disturbance in the circulation proves fatal sooner or later. In the 12 cases on record, the affection had a protracted course in 4. The patient in the case described was a printer of 42, previously apparently healthy, who succumbed in a few days with dyspnea, cyanosis and other symptoms suggesting pneumonia.

25. **Hydro-Hemolysis Test for Tubercle Bacilli.**—Ten c.c. of human blood are diluted with 200 gm. of distilled water which destroys the blood corpuscles almost at once. The limpid fluid is then distributed in two or three vials and centrifuged; the sediment is then spread on six or eight cover glasses and examined for bacilli. These stain and show up finely, and are detected with much greater facility and more promptly than by other technics.

Semaine Médicale, Paris.

32 (XXV, No. 25, June 21.) *Tétanie d'origine parathyroidenne. G. Marinesco.
33 (No. 26.) *Traitement chirurgical précoce des collections liquides endo-pulmonaires, non tuberculeuses. F. Lejars.
34 (No. 27.) *La rétention de l'urée dans le mal de Bright, comparée à la rétention des chlorures. F. Widal and A. Javal.
35 (No. 29.) *Les émotions morales peuvent-elles déterminer des affections organiques aigues du système nerveux? L. Cheinisse.

32. **Tetany of Parathyroid Origin.**—Marinesco's article is a clinical lecture on a case of intermittent tetany exhibiting several symptoms supposed to be peculiar to exophthalmic goiter. He reviews the various causes of tetany, calling attention to the fact that the thyroid body becomes hypertrophied during gestation, and that the lack of this physiologic hypertrophy is liable to entail serious disturbances. On the other hand, gestation has an unfavorable influence on already existing thyroid and parathyroid insufficiency, as has been abundantly proved by clinical and experimental research. This suggests that tetany and eclampsia may be the result of parathyroid insufficiency. This assumption is corroborated by Vassale's recent success in treatment of eclampsia with extract of parathyroid glands, chronicled in THE JOURNAL recently, page 363. Marinesco put his patient on this organ therapy and during the twenty-three days interval at date of writing the tetany had not reappeared and the other symptoms had gradually subsided. He used beef parathyroid glands and is convinced that this parathyroid treatment has a promising future in treatment of various forms of spasmodic contractions.

33. **Early Surgical Treatment of Intrapulmonary Non-Tuberculous, Fluid Pockets.**—Lejars denounces the dilatory way in which morbid processes in the lungs are allowed to develop unhindered. Their spontaneous irruption into the air passages and expulsion by a vomica are rare occurrences and the physician should not trust to such an event. The dangers of delay outweigh those of a vague diagnosis, and early surgical intervention should be the rule, not the last resource. It is the only means of cure in the majority of cases, and the physician and surgeon should endeavor to popularize it.

34. **Retention of Urea in Bright's Disease.**—Widal and Javal summarize their extensive study of this subject in the statement that chlorids and urea may be retained in the organism together or separately in the course of Bright's disease. The mechanism of their accumulation varies for each. In the course of the "uremic" state the phenomena due to the retention of the chlorids are distinct from those due to the accumulation of nitrogen in the blood. These two kinds of retention offer entirely different indications for dietetic treatment. Deprival of salt is effectual in combating the water-accumulating effects of retention of the chlorids. When the nitrogenous bodies are accumulating in the blood, ingestion of albuminoids should be reduced. Administration of from 100 to 150 gm. of lactose aids in nourishing the patient while it does not favor the development of toxic substances, and with abundance of water is liable to banish the attacks of eclampsia and the edema, as occurred in a recent case in Lemierre's experience, after four days of this lactose and water diet. The theoretic régime for a patient with retention of nitrogenous bodies would be exclusively carbohydrates and fats, substances which form merely carbonic acid and water in their disassimilation. Such a diet, however, could be imposed only for a short time, as albuminoids are necessary for regeneration of the tissues. Comparison of the proportion of urea in the blood with the proportion of albumin in the diet allows the quantity of albuminoids to be ingested to be scientifically regulated. Local or general venesection is a valuable aid in this disease, and it allows surveillance of the proportion of urea in the blood which should be systematically determined. As a general rule, however, the amount of albumin allowed in Bright's disease should be moderate but sufficient. Milk is not so innocent as generally supposed, for 3.5 liters contain about 120 cm. of albumin, that is, more than the normal man has need of. The milk supplies also too much water for certain cases. Out of 3 patients who died with an excess of urea in the blood, 2 had been on a milk diet for several weeks and one had ingested nothing but 3 liters of milk a day for the space of two years, when the first symptoms of the terminal uremia developed. It must not be forgotten that the nitrogen in the food, whether from meat, vegetables or milk, leads to the production of urea. Milk owes its value in kidney disease to the lack of salt, and Widal's experience has demonstrated that it can be advantageously replaced by substituting for 3 liters of milk, 400 gm. of meat and 500 gm. of bread, without salt, or a milk-vegetable diet which is much more appetizing. Meat in itself is not injurious in kidney disease. As a general rule, from 100 to 200 gm. of meat will be found sufficient to supply the necessary albuminoids while imparting variety to the diet. Research on patients whose blood was tested repeatedly for urea, has only confirmed the value and harmlessness of this amount of meat given in combination with starchy substances or milk. An excess of salt should always be avoided in the diet as a precautionary measure, and likewise an excess of albumin, as one never knows when accumulation and retention may be impending.

35. **Are Moral Emotions Able to Induce Organic Nervous Affections?**—Cheinisse answers his question in the affirmative, and cites a number of instances to sustain his assertion that a psychic shock under certain circumstances may induce an anatomic lesion of the nerve centers, just as it may favor the development of epilepsy, hysteria or a neurosis of any kind. He insists also on the fact that a certain interval may and usually does elapse between the emotion and the first manifestations of the consecutive nervous affection. Paralysis from fright and similar affections may be readily cured by appropriate measures, but, on the other hand, they may persist, and the prognosis should always be more or less guarded.

Berliner klinische Wochenschrift.

36 (XLII, No 26, June 26.) Aetiologie und spezifische Therapie des Heufiebers (hay fever). Dunbar.
37 Ueber isoform-dermatitis bei einem mit Iodoform-Idiosynkrasie behafteten Kranken. E. Hoffmann.
38 *Eine neue Palliativ-operation bei benignen Mastdarm-Strikturen (of rectum). Leuk.
39 Heilung der tuberkulösen Peritonitis an einem spontan geheilten Falle. A. Köppen (Norden).
40 Ueber den Wirkungskreis der Balneotherapie in der Gynäkologie. L. Nenadovics.
41 *Ueber die primäre Mikrogastrie. J. Bendersky.
42 *Die Balneotherapie der Harnkrankheiten (of urinary affections). C. Posner.
43 Mushroom Poisoning.—Pilzvergiftung. T. A. Maass.

38. **Palliative Operation on Stricture in Rectum.**—Leuk has performed in several cases an exceedingly simple operation which apparently answers the desired purpose as effectually as the more complicated technics. His first patient was a woman of 35, with a history of syphilis. Between 4 and 5 cm. above the anus a circular stricture narrowed the lumen to 1 cm. He excised a wedge of the stricture large enough to allow the passage of feces through the opening thus enlarged. The incision was restricted to the constricting parts, and did not enter the underlying tissues. This prevented any secondary cicatrix formation and shriveling. The excision was done through the speculum without fear of hemorrhage, as Allingham has expressly declared that "hemorrhage from the rectum need not be feared." During the two years since the patient has been free from any disturbances in defecation without restrictions as to diet. The local inflammation in the rectum has been materially reduced, and the general health has improved, while there has been no further increase in the constriction. The effects were equally good in two similar cases. He urges that this simple measure should be given a trial before undertaking more complicated technic, as it is liable to prove all that is necessary, and if not, it does not interfere with more radical procedures later.

41. **Congenital Small Stomach.**—Bendersky's article on what he calls "microgastria" has already been mentioned in these columns. He has found that certain persons, always women, have an abnormally small stomach. They suffer from repeated uncontrollable vomiting, apparently of the nervous type. They are also subject to obstinate hiccoughing. He thinks the condition is analogous to the infantile uterus, and suggests that the food should be taken in small amounts. Treatment is of little use except possibly repeated lavage of the stomach, as the mucous membrane seems to be abnormally sensitive in these cases.

42. **Balneotherapy in Urinary Affections.**—Among the points emphasized by Posner is the necessity for discriminating between salt-containing and salt-free waters in treatment of urinary affections. The action of salt in inducing edema has been amply demonstrated in the last few months. Chronic catarrh of the bladder and kidney pelvis seem to be best adapted for treatment with mineral waters. Chronic parenchymatous nephritis contraindicates them. Neuroses of the urinary and sexual apparatus are often favorably influenced by a course of treatment at a watering place.

Deutsche medizinische Wochenschrift, Berlin and Leipsic.

Last indexed page 669.

44 (XXXI, No. 26.) Official Reports on Epidemic Cerebrospinal Meningitis. v. Lingelsheim and Radmann.
45 Ueber Darstellungsweise und Befund der bei Lues vorkommenden Spirochaete pallida. K. Herxheimer and H. Hübner.
46 Zur Färbung der Spirochaeta pallida (Improved stain). G. Giemsa.
47 *Die Behandlung infektionsverdächtiger und infizierter Wunden, einschliesslich der panaritialen, phlegmonösen, furunculösen Entzündungen (treatment of inflammations). P. L. Friedrich.
48 Myopie-Operation und Netzhautablösung (detachment of retina). A. v. Hippel.
49 *Zur Diagnose und Therapie der chronischen Perityphlitis. A. Albu. (Commenced in No. 25.)
50 Ueber Bau und Einrichtung von Räumen zur Behandlung von Gehstörungen (equipment for treating disturbances in walking). Kann.
51 (No. 27.) Behandlung der Ekzeme. O. Lassar.
52 *Ueber die Diagnose und Therapie der chronischen Perityphlitis. I. Boas.
53 *Perityphlitis und Gravidität. C. J. Gauss.
54 *Zur Behandlung eingeklemmter Brüche (incarcerated hernia). Brix.
55 (No. 28.) *Ueber Kleinhirn-Cysten (cysts in cerebellum). Lichtheim.
56 *Technic of Removal of Cancer in Rectum.—Die Erhaltung des Schliessmuskels bei der Exstirpation des Mastdarmkrebses und seine spätere Funktion. P. Kraske.
57 Zur Frage der Bildung von bakteriellen Angriffsstoffen im lebenden Organismus (aggressin formation). A. Wassermann and J. Citron.
58 Surface Tension of Body Juices.—Ueber die Oberflächenspannung von Körpersaften unter physiologischen und pathologischen Bedingungen. A. Bickel.
59 Anemia and Liver Functions in Syphilis.—Untersuchungen zur Pathogenese der Anämie und zur Funktionsprüfung der Leber bei Syphilitikern. C. Stern.
60 Der Tod in der Morphinum-Skopolamin Narkose (death from anesthetic). H. Landau.
61 *Zur lokalen Sensibilisierung und Immunisierung der Gewebe gegen die Wirkung der Radiumstrahlen (tissues and radium rays). R. Werner.

47. **Treatment of Infected or Suspicious Wounds.**—Friedrich writes from Bier's clinic and states that his observation of Bier's method of treating even acute inflammations by inducing passive congestion has converted him from a pronounced opponent to an admirer, although he is waiting for time to pass final judgment on this technic. He is convinced that the adoption of physical measures in the treatment of wounds, abandoning the chemical, and striving to promote and supplement the biologic processes, is the greatest advance since Lister. In all wounds suggesting the possibility of tetanus, he advises total excision of the focus and foreign body, supplemented by preventive injections of antitoxin.

49. **Treatment of Chronic Perityphilitis.**—Albu proclaims that the indication for surgical intervention, in these cases at least, should not be the pathologic condition, but the impairment of health. He does not advise operating in chronic perityphilitis unless the diagnosis is absolutely sure, and when serious disturbances persist after careful internal treatment, including rest in bed, regulation of the bowels, wet packs, sitz baths and belladonna. He relates a number of cases which simulated chronic appendicitis but proved to be visceral neuralgia or hysteroneurasthenia, spastic obstipation or other affection, readily yielding to the above internal measures.

52. **Id.**—Boas does not regard the prognosis of chronic appendicitis as very serious, but still he advises the removal of the appendix even in the cases in which the inflammation never becomes acute. Internal treatment is of little benefit in these interminable chronic cases. Chronic inflammation developing after an acute attack should always be operated on, as also persisting disturbances in children and at the age of puberty. In the young, physical and dietetic restraint is absolutely unenforceable, and the appendix should be removed. He has never known of an instance of the complete cure of chronic perityphilitis. Sooner or later the patients return.

53. **Appendicitis and Pregnancy.**—Gauss describes 2 cases of appendicitis complicating pregnancy to call attention to the difficulty of diagnosis and the special indications in these cases. Differentiation and treatment require simultaneous gynecologic and obstetric experience with surgical and internal medical co-operation.

54. **Treatment of Incarcerated Hernia.**—Brix again calls attention to the readiness with which incarcerated hernia can be reduced after being sprayed with ethyl chlorid. He has frequently witnessed spontaneous reduction of the hernia under the spray.

55. **Cysts in Cerebellum.**—Lichtheim reports 2 cases of cysts in the left half of the cerebellum accurately diagnosed and operated on by Garré. The symptoms subsided afterward in each case with the exception of the irreparable optic atrophy.

He urges exploratory incision and prompt intervention to forestall choked disc in such cases.

56. **Retention of Sphincter Muscle in Removing Rectal Cancer.**—Kraske reports 14 cases which illustrate the advantages of the technic which he advocates and follows.

61. **Means to Enhance Action of Radium Rays.**—Werner relates the result of extensive research on the action of radium and means to enhance it. He found that the tissues reacted much more intensely to the rays when previously sensitized with injections of activated lecithin or of a solution of eosin. Still better results were obtained by a slight preliminary inflammatory reaction induced either by chemical, thermic or mechanical irritation or congestion. He became convinced that the local accumulation and destruction of leucocytes by these measures was an important factor in the result, and hence increased it by preceding leucocyte-attracting injections of turpentine or nucleic acid. He also found it possible to render the tissues more resistant or immune by a preceding prolonged irritation, refrigeration or preliminary exposure to the rays. He suggests that a combination of these various measures might materially enhance the value of radium therapy. By rendering the surrounding tissues immune and by increasing the susceptibility of the pathologic tissues, it might prove possible to increase the intensity of the exposure and to lengthen it without harm.

Jahrbuch f. Kinderheilkunde, Berlin.

Last indexed page 663.

62 (LXI, No. 1.) *A Model Pediatric Clinic.—Entstehung der Breslauer Kinderklinik, die Aufgaben einer pädiatrischen Klinik und den Betrieb wie er in Breslau in Klinik und Poliklinik geübt wird. A. Czerny.
63 Zur Frage des künstlichen Morbus Barlow bei Tieren (experimental scorbutus). L. Bartenstein.
64 Fat in Food and Infant Metabolism.—Zur Wirkung der Fettdarreichung auf den Säuglingsstoffwechsel. W. Freund.
65 3 Fälle von Pachymeningitis hæmorrhagica mit Hydrocephalus externus. F. Goppert.
66 Lähmung der Glottiserweiterer im frühen Kindesalter (paralysis of glottis in infant). A. Hüssy.
67 *Ueber alimentäre Albuminurie. J. Kaliski and R. Weigert.
68 Elimination of Carbon and Nitrogen Through Urine in Infants and Older Children.—Die Kohlenstoff- und Stickstoffausscheidung durch den Harn beim Säugling und seine Bedeutung. R. Quest.
69 *Treatment of Obesity in Children.—Ueber Entfettungskuren im Kindesalter. A. Orgler.
70 *Lime in Infantile Brain.—Ueber den Kalkgehalt des Säuglingsgehirns und seine Bedeutung. R. Quest.
71 Zur Kenntnis der natürlichen Immunität des Kindes im ersten Lebensjahr (under one year). A. Schütz.
72 Ueber Demineralisation und Fleischtherapie bei Tuberkulose (zomotherapy). F. Steinitz and R. Weigert.
73 Beitrag zur Frage der Thymus-Hypertrophie. G. Tada.
74 Ueber die Herkünft des fötalen Fettes (origin of fetal fat). M. Thiemich.
75 *Influence of Diet on Chemical Composition of Organism.—Ueber den Einfluss der Ernährung auf die chemische Zusammensetzung des Organismus. R. Weigert.
76 *Die exsudative Diathese. A. Czerny.
77 (No. 2.) Aims of Modern Pediatrics.—Die Grundlagen und Ziele der modern Pädiatrie. Th. Escherich.
78 Zur Kenntnis der Poliomyelitis anterior acuta und subacuta s. chronica. E. Lävegren.
79 Biologisches zur Milch-Pasteurisierung (of milk). A. Hippius (Moscow).
80 Zur Kenntnis des Meningococcus intracellularis. B. Weyl.
81 (No. 3.) Ein weiterer Beitrag zur Kenntnis der Energiebilanz beim Säugling (balance of energy in infants). O. Heubner.
82 Acetonuria in Infectious Diseases in Children.—Zur Kenntnis der Azetonurie bei den Infektions-Krankheiten der Kinder. L. F. Meyer.
83 Die Acidose im Kindesalter (in children). L. Langstein and L. F. Meyer.
84 Immunisierung durch Milch (immunization by milk). B. Salge.
85 Zur Bekämpfung der grossen Säuglingessterblichkeit (infant mortality). M. Ebert.
86 Zur Kenntnis des periodischen Erbrechens im Kindesalter (periodical vomiting of children). P. Misch.
87 (No. 4.) Food and Energy Needed by Breast-Fed Infant.—Beitrag zur Frage nach dem Nahrungs und Energiebedürfnis natürlich ernährten Säuglings. P. Reyher.
88 Ueber den Fettgehalt der Frauenmilch (fat in human milk). Id.
89 Zur Kenntnis des Kreatininstoffwechsels beim Säugling (creatin metabolism in infants). H. Rietschel.
90 Zur Kenntnis der hämorrhagischen Erytheme im Kindesalter. L. Langstein.
91 (No. 5.) *Ueber "paradoxes Schwitzen" beim Kinde (paradoxical sweating in a child). J. Zappert.
92 Poliomyelitis.—Klinische Untersuchungen an 240 Fällen von spinaler Kinderlähmung (spinal paralysis). R. Neurath.
93 Tuberkulose im ersten Lebensjahre (in first year of life). F. Stirniman (Zurich).
94 Serum-Behandlung der Diphtherie. Zur Haltbarkeit des Serums. R. Kraus.
95 Ueber congenitale familäre Hypoplasie des Kleinhirns (of cerebellum). H. Frenkel and L. Langstein.

62. **The Breslau Clinic for Children's Diseases.**—Czerny protests against regarding the infant department as a mere appendix to the pediatric clinic. It should be considered the most important feature of the institution. Orthopedics and surgery have no place in the pediatric polyclinic, it should be devoted almost exclusively to children under two years of age. It should aim to keep a running record of each case and to follow the children from year to year. By this means, material of incalculable value will be accumulated, and many workers in various well-managed children's clinics can cooperate in a single task. Study of the physiology and pathology of the child during its first two years of life is the most important part of the pediatrist's work.

67. **Alimentary Albuminuria.**—Kaliski and Weigert fed large amounts of albumin to healthy children—as much as 24 raw eggs in two days in some instances, and 42 in three days in another. In only 2 of the entire number of children could even traces of albumin be detected in the urine thereafter. The tests with cooked albumin were all negative. They suggest as a possible explanation for alimentary albuminuria the assumption of insufficient digestion—a condition of gastric achylia. Persons in this condition should be preferred for the tests.

69. **Treatment of Obesity in Children.**—Orgler recommends potatoes and fluids in abundance with avoidance of fat and sauces. An obese boy on these restrictions lost ten pounds in the course of a month. The nitrogen balance was kept up or nitrogen taken in excess, as shown in the dietary appended.

70. **Lime Content of Infants' Brains.**—Quest announces that the proportion of lime in the brain of the fetus or newly-born child is remarkably large, but that it soon sinks to the ordinary proportion. He is inclined to regard a deficiency of lime as possibly responsible for the increasing tendency to cerebral excitability in children. The brains of 3 children who had succumbed to convulsions showed an abnormally small proportion of lime in their composition.

75. **Influence of Food on Chemical Composition of Organism.**—The percentage of water is a decisive factor in artificial culture media, and Weigert suggests that this may be a factor also in individual immunity. Extensive experiments on animals demonstrated that the character of the food has a marked influence on the retention of water in the body. The proportion of water is the highest when the food consists principally of carbohydrates. Other experiences are related which lend plausibility to this view that individual immunity may be influenced by the character of the food and the consequent retention of water. The large amount of easily digested fat in the breast milk may be one cause for the relative high immunity of breast-fed children.

76. **The "Exudation Diathesis."**—Czerny suggests that a congenital anomaly may be responsible for various affections accompanied by exudation, such as eczema, recurring bronchitis, tonsillitis, retropharyngitis and other affections of mucous membranes. They form a group with features in common, suggesting a congenital anomaly of the juvenile organism. The course of the individual cases is determined by the character of the food, the condition of the nervous system and intercurrent infections. Avoidance of all overfeeding, a vegetable diet, excluding even eggs, and systematic disregard of exaggerated subjective disturbances and scrupulous avoidance of intercurrent infections are the most important means of combating this "exudative" diathesis.

91. **Paradoxical Sweating in a Child.**—The child was a girl of 6, who perspired at certain points, the back of the head, breast, etc., on exposure to cold. The tendency to this abnormal perspiration occurred at periods of a few months, with long intervals. Under arsenic the periods have become shorter, the intervals longer, and the tendency has been much reduced.

Therapie der Gegenwart, Berlin.

Last indexed page 667.

96 (XLVI, No. 6.) *Die Heilyung des Krebses der Gebärmutter (cancer of uterus). Max Runge (Göttingen).
97 *Zur intravenösen Injektionstherapie. W. Doevenspeck.
98 *Ueber der Indikationen und Kontraindigationen der Anwendung von Eisenpräparaten bei Magenkrankheiten (iron in stomach diseases). H. Elsner (Boas' clinic, Berlin).

99 *Künstliche Sauermilch als diätetische Therapie kranker Säuglinge (artificially soured milk for sick infants). Otto Rommel (Munich).
100 *Ueber Arbeitstherapie" (occupation therapy). B. Laquer Wiesbaden). Reply to Veraguth.

96. **Cancer of the Uterus.**—Runge sees hope for better results in the treatment of carcinoma of the uterus in further improvement of operative technic, but more especially in an earlier diagnosis of the disease. The earlier the patient comes to operation the more satisfactory the results will be. The great moral responsibility resting on the family physician, to whom such patients usually first apply, must be thoroughly appreciated. The symptoms of beginning carcinoma should be borne in mind, especially the fact that pain is a late appearing symptom, and the importance of irregular and easily induced hemorrhage. The physician should realize that, especially in cancer of the cervix, the hours are precious and a day's delay in confirming the diagnosis may be fraught with momentous consequences. He should use every effort to persuade the patient to permit an immediate examination. A piece of tissue excised should be submitted at once to an expert. If doubt exists, it is best to send the patient at once to a specialist. It is important also that women should be instructed to note every suspicious symptom and not to be misled by the idea of "change of life," etc. Midwives are often consulted, and they should be cautioned against giving an opinion on these matters, and the physician should refrain from prescribing without thorough examination. Women should be cautioned against trusting to the representations of irregular practitioners.

97. **Intravenous Injections.**—Doevenspeck can not corroborate the favorable opinion of Mendel in regard to the results of intravenous injections of salicylic acid compounds and thiosinamin. He has had much less brilliant success, finding in several cases that, after the intravenous injection had failed, other modes of applying the salicylates were successful in curing obstinate rheumatic affections. The effect of thiosinamin in removing cicatricial tissue was never striking, and the failures outnumbered the successes. The author cannot, therefore, agree with Mendel that this method will constitute the therapy of the future, on account of its exacting technic and of the fact that it offers only slight advantages over ordinary methods. He thinks, however, that it is capable of more extensive application than would appear from the present reports. Extensive trials of it have been made in Italy, where the intravenous route is commonly used, and animal experiments have shown that the veins bear the introduction of considerable amounts of various medicines without harm.

98. **Iron in Stomach Diseases.**—Elsner considers it established that iron is absorbed and assimilated, and that organic combinations are the most suitable for therapeutic administration because iron is contained in the food in proteid combination. A difference in the hemoglobin-forming power of the various preparations of iron has not been demonstrated, so that the choice of the various preparations at present should be decided by their effect on the digestive organs. Elsner experimented with a hemoglobin preparation to determine its effect upon the digestive functions. He concludes as follows: Symptoms of dyspepsia do not contraindicate the use of iron preparations, but in such case functional investigation of the stomach should precede the use of iron. Iron preparations are contraindicated in organic stomach disease with hyperacidity or hypersecretion, and if existing dyspeptic troubles are increased by the use of the iron.

99. **Artificially Soured Milk as a Dietetic Treatment for Infants.**—Remmel has substituted for buttermilk, as a food for sick children, an artificially soured milk made by inoculating pure centrifuged milk ("skim milk") with a pure culture of lactic acid bacilli. The milk is boiled with a chemically pure preparation of starch, which causes the casein to assume a colloidal form. The best test for the success of the preparation is the smell and taste. The odor should be feebly acid and pleasantly aromatic, and the taste should be a sweetish sour, never bitter or rancid. If the stomach rejects it or the number of stools are increased, the fault probably lies in the preparation. In such cases it should be omitted for a few days and a new beginning made with a fresh preparation. Soxhlet's nutrient sugar is added to the extent of 25 gm. per liter, together with an equal amount of cane sugar and from 10 to 15 gm. of the starch preparation. When cool, the "acidifying tablet" is added. This he has found to be of the greatest advantage, as it allows the use of other carbohydrates that otherwise could not be tolerated. This food is usually well liked by children. In regard to indications for the use of the soured milk he concludes that the acute, often febrile, bacterial diseases of the intestine after a period of abstinence, furnish an indication for the sour milk diet, with the exception of intestinal troubles caused by a too rich carbohydrate diet with fermentation and slimy stools. It is still more necessary, however, in chronic nutritive disturbances from the lightest dyspepsia with relative hypochylia, to the most severe, often apparently irreparable atrophy with extensive disturbance of metabolism. He suggests its use for adults in metabolic disturbances (diabetes and gout), as well as in gastrointestinal diseases and tuberculosis, and as a convalescent diet on account of its being rich in albumin, easily digested, and cheap.

Books Received

Acknowledgment of all books received will be made in this column and this will be deemed by us a full equivalent to those sending them. A selection from these volumes will be made for review, as dictated by their merits, or in the interests of our readers.

ADDRESS ON PARENTAL RIGHT AND PARENTAL RESPONSIBILITY. Viewed in Relation to the Right of the Community. C. K. Mackellar, M.B., M.L.C., at the Public School Teachers' Conference, June 26, 1905. Paper. Pp. 17. Published by the authority of the Government of the State of New South Wales. Sydney: Wm. A. Gullick, Government Printer, 1905.

PATHOLOGY AND MORBID ANATOMY. T. H. Green, M.D., F.R.C.P. Tenth American Revised from the English Edition, Revised and Enlarged by W. C. Bosanquet, M.A., M.D. 1 colored plate, and 348 illustrations. Cloth. Pp. 610. Price, $2.75 net. Philadelphia: Lea Brothers & Co., 1905.

MONTHLY SUMMARY OF COMMERCE AND FINANCE OF THE UNITED STATES. June, 1905. Department of Commerce and Labor Bureau of Statistics. No. 12. Series 1904-1905. Paper. Pp. 4,780. Washington: Government Printing Office, 1905.

MANUAL OF THE DISEASES OF THE EYE, for Students and Practitioners. C. H. May, M.D. Fourth Edition. 360 original illustrations, including 21 plates, with 60 colored figures. Cloth. Pp. 391. Price, $2 net. New York: Wm. Wood & Co.

READY REFERENCE HANDBOOK OF DISEASES OF THE SKIN. G. T. Jackson, M.D. 91 illustrations and 3 plates. Fifth edition. Cloth. Pp. 676. Price, $2.75 net. Philadelphia. Lea Brothers & Co., 1905.

TEXT-BOOK OF PHYSIOLOGICAL CHEMISTRY for Students of Medicine. J. H. Long, M.S., Sc.D. Cloth. Pp. 424. Price, $2.50. Philadelphia: P. Blakiston's Son & Co., 1905.

NEW PATENTS.

Recent Patents of Interest to Phisicians:

795678 Apparatus for regenerating exhaled air for respiration purposes. Max Bamberger, F. Bock and F. Wanz, Vienna, Austria-Hungary.
795679 Regenerating exhaled air for respiration purposes. Max Bamberger, F. Bock and F. Wanz, Vienna, Austria-Hungary.
795573 Atomizer. Wm. J. Barber, Honeoye Falls, N. Y.
795757 Formaldehyd product and making same. Henry S. Blackmore, Mount Vernon, N. Y.
795510 Bottle holder for medicine cases. Augustus W. Hoff, New York, N. Y.
795524 Invalid elevator and truck. Richard Leffmann, Chicago, Ill.
795366 Oil-atomizer. Washington L. Parker, Elgin, Ill.
795562 Absorbent and deodorizer. Silvio T. Tatti, Buenos Ayres, Argentina.
795567 Endoscope or other optical instrument. Reinhold L. Wappler, New York.
795323 Apparatus for electrothermal treatment. D. M. Watson, Portland, Ore.
795469 Sanitary belt. Arthur M. Young, Chicago, Ill.
796114 Electrotherapeutic apparatus. H. E. Currey, Baker City, Ore.
795903 Physicians' operating table. Barzillai B. Foster, Portland, Me.
795866 Inhaler. Joshue R. Spanogle, Athena, Ore.
796791 Bedstead for invalids. James C. Anderson, Victoria, Can.
796552 Ligature container. Perry S. Bauer, Chicago, Ill.
796496 Peptonized milk and making same. J. H. Campbell, Brooklyn, N. Y.
796713 Making urea. Hans Foersterling and H. Philipp, Perth Amboy, N. J.
797094 Surgical bandage plaster. Jacob Benario, Frankfort-on-the-Main, Germany.
797510 Surgical bandage. Carl Fuhrhans, Munich, Germany.
797365 Douche. Christian W. Meinecke, Jersey City, N. J.
797024 Making phenol esters. Fin Sparre, Wilmington, Del.
797335 Artificial hand. Zachariah D. Taylor, Clay, W. Va.
797483 Bandage-rolling machine. Frank G. Wilkins, Washington, D. C.

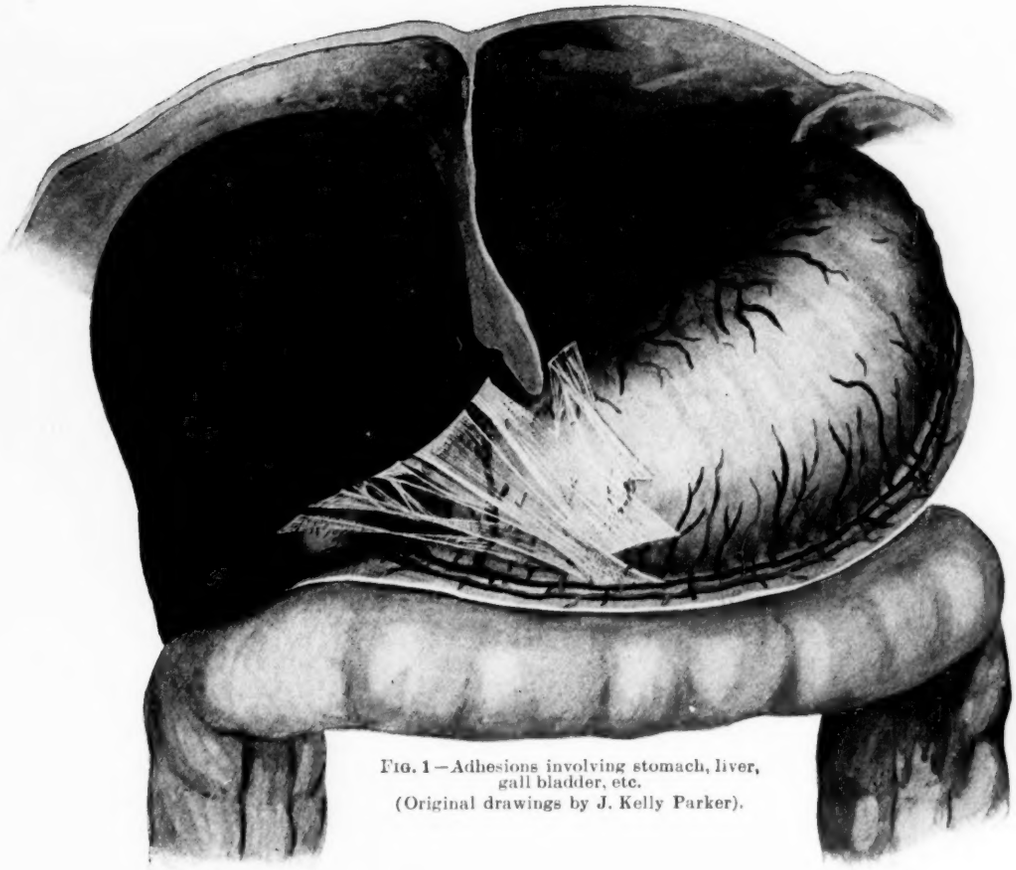

FIG. 1—Adhesions involving stomach, liver, gall bladder, etc.
(Original drawings by J. Kelly Parker).

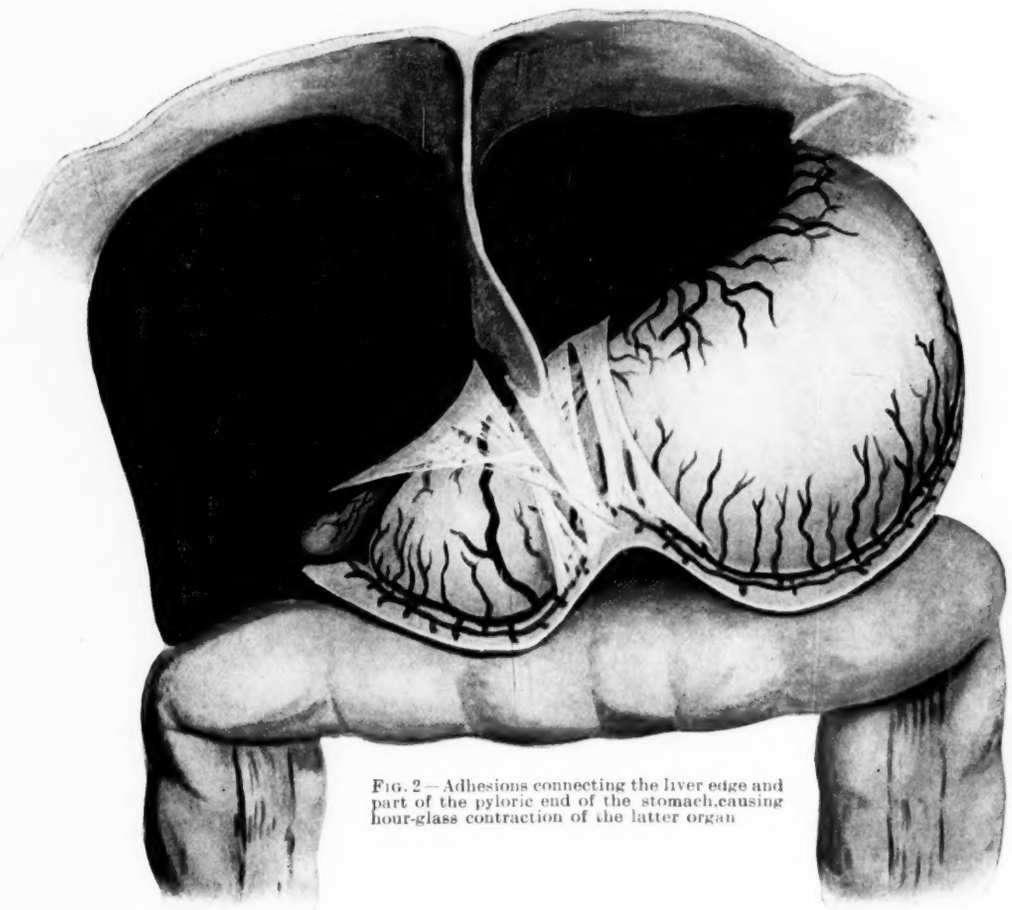

FIG. 2—Adhesions connecting the liver edge and part of the pyloric end of the stomach, causing hour-glass contraction of the latter organ

FIG. 3—Operation for relief of perigastric adhesions, showing adhesions cut and sutures inserted.

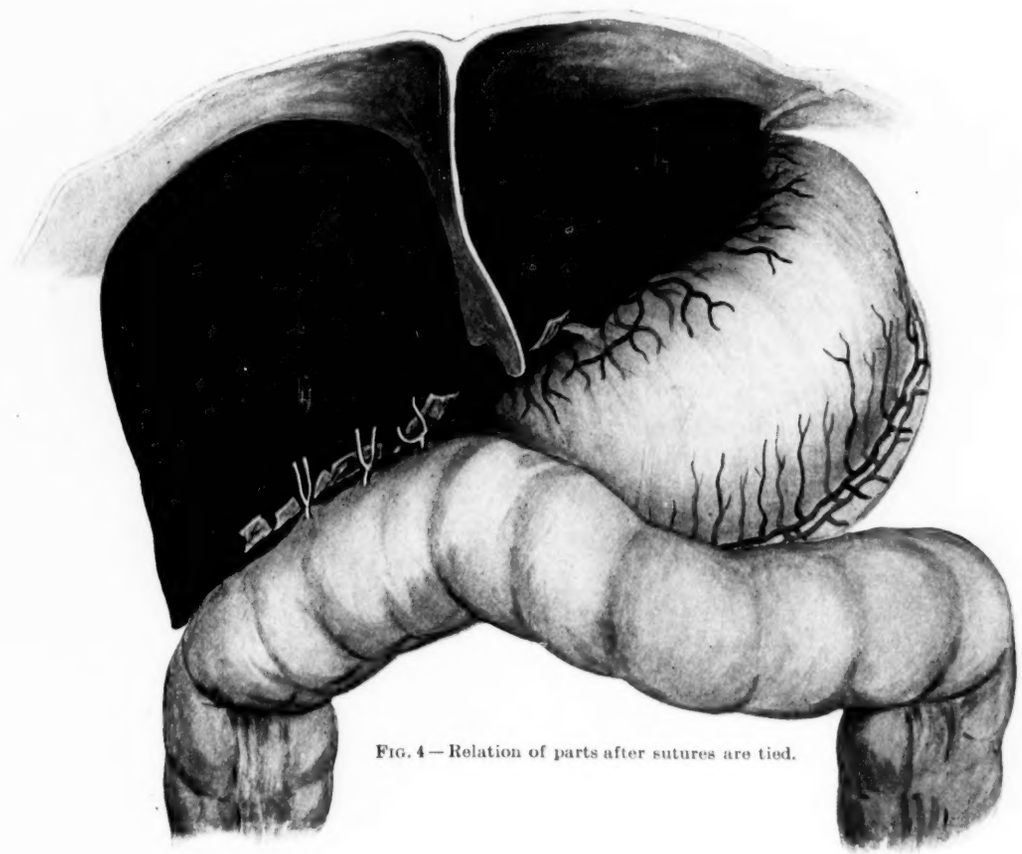

FIG. 4—Relation of parts after sutures are tied.